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SUNOL/NILES DAM REMOVAL PROJECT

Environmental Impact Report
Planning Department Case No. 2001.1149E
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Draft EIR Publication Date: October 24, 2005
Draft EIR Public Hearing Date (San Francisco): December 1, 2005
Draft EIR Public Hearing Date (Fremont): November 30, 2005
Draft EIR Public Comment Period: October 24, 2005 to December 7, 2005

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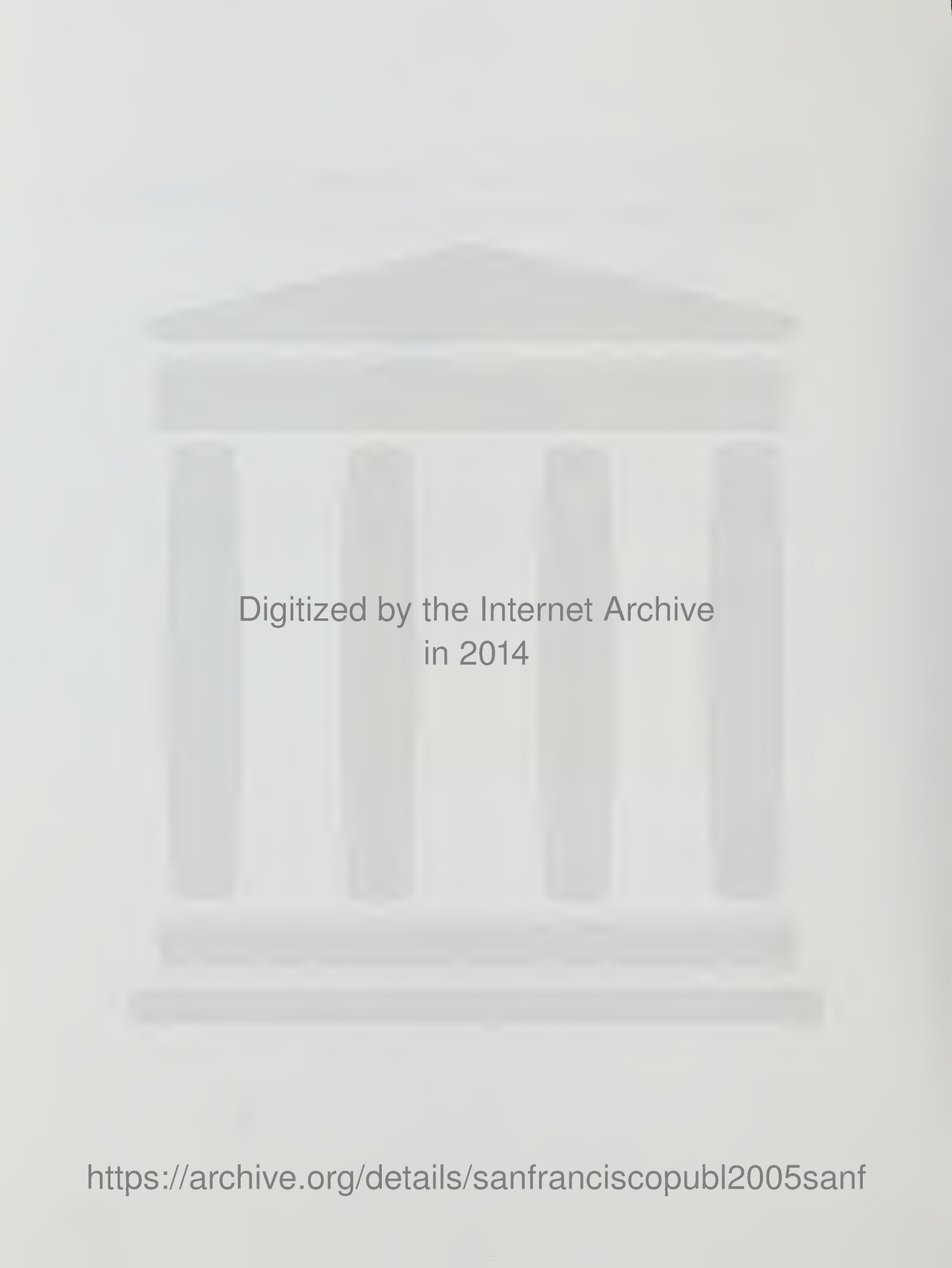
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San Francisco Public Utilities Commission
Sunol and Niles Dam Removal Project
Environmental Impact Report

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CHAPTER I
Summary

A. Introduction

The San Francisco Public Utilities Commission (SFPUC) is proposing to partially remove Sunol and Niles Dams, which are located in the Niles Canyon reach of Alameda Creek in Alameda County.

There are three primary and equal project objectives:

1. Remove barriers to fish passage in keeping with the Alameda Creek Fisheries Restoration Workgroup goal of restoring a self-sustaining population of steelhead to the Alameda Creek watershed, while recognizing other beneficial uses (e.g., water supply and flood control).

2. Reduce or eliminate an existing public safety hazard and related SFPUC risk management concerns.

3. Perform dam removal in an environmentally sensitive manner.

In association with removal of the dams, impounded sediment would be left in place to move downstream naturally over a period of several decades. Removal of the dams is proposed to occur between May and November of 2006.

In accordance with the California Environmental Quality Act (CEQA), the San Francisco Planning Department prepared and circulated an Initial Study on the proposed project in July 2004. The Initial Study concluded that this project could have a significant effect on the environment and that an environmental impact report (EIR) was required. This Draft EIR (DEIR) focuses on the impact areas that were identified in the Initial Study as potentially significant, including: compatibility with existing zoning and plans (conflicts with any adopted environmental plans and goals of the city or region); transportation/circulation; utilities/public services (published national, state, or local standards relating to solid waste or litter control; and major expansion of power, water, or communications facilities); biology; geology/topography (exposure of people or structures to major geologic hazards); water (degradation of water quality; degradation or depletion of groundwater resources, or substantial interference with groundwater recharge; and flooding, erosion, or siltation); historical resources, and noise.

The differences between the project described in this DEIR and the one evaluated in the Initial Study are as follows:

- The project no longer includes removal of all of the sediment from behind Sunol and Niles Dams.
- Sunol Dam would no longer contain a low-flow notch. The final crest of the dam would be flat all the way across.
- An adverse slope across the Sunol Dam width, from downstream to upstream, would be cut across the top of the dam to alter it from a broad-crested weir to a sharp-crested weir.[1] This alteration would reduce the risk of the dam acting as a fish barrier, should the dam crest become exposed.
- An additional 66 feet of the left abutment[2] of Niles Dam would be removed as well as a greater portion of the right abutment, as geotechnically feasible.

The purpose of this DEIR is to assess potential environmental impacts associated with the removal of Sunol and Niles Dams. The San Francisco Planning Department, Major Environmental Analysis (MEA) section, is the lead agency responsible for the environmental review process, and the San Francisco Planning Commission must certify that this EIR is accurate and complete before the SFPUC can take action on the proposed project. As part of the environmental review process, the Planning Department will conduct a public hearing in Fremont on November 30, 2005 and one in San Francisco on December 1, 2005 to solicit comments from the public and agencies on the DEIR. The public comment period is from October 24, 2005 to December 7, 2005.

B. Project Description

Sunol Dam

Diversion/Dewatering of Alameda Creek

Before removing the dam and during dam-removal activities, flows from Alameda Creek would be diverted around the project area and discharged below the work area. Three options for the creek diversion are being considered. The first option consists of installing a small cutoff dam at the upstream end of the proposed work area and installing a steel pipeline with flexible mechanical couplings below the dam. Construction of the upstream gravel cutoff dam would be performed using an excavator and/or bulldozer. If sheetpiles were to be used, they would be installed using an excavator fitted with a vibratory driving attachment. An excavator or bulldozer would be used to construct a work platform or deck above the water to keep heavy equipment out of the active channel. The work platform would be constructed of gravels and/or heavy timber. Construction of the diversion channel would be performed using a backhoe and/or small bulldozer.

[1] A "broad-crested" weir has a flat top, while a "sharp-crested" weir has an angled top.

[2] References to left and right are from the viewer's point of view when looking downstream.

Modifications to the header box and upstream concrete structure would require an air-compressor for a portable pneumatic hammer.[3] The diversion pipe would be installed with an excavator, which would set the pipes, couplings, and fittings in place. The pipeline might need to be moved as work progresses.

The second option would modify the existing Sunol Aqueduct to divert creek flows around the project site. Modifications to the Sunol Aqueduct would consist of the following:

- Downstream Modifications. A temporary diversion pipe and plug would be installed at the header box to plug the opening that leads across the crest of the dam. A 200-foot diversion pipe would carry creek flows downstream of the worksite. A portion of the diversion pipe would be buried with native gravels and cobbles to form a berm that would act as a stream cutoff, provide equipment access to the left side of Alameda Creek, and create a downstream settling basin.

- Upstream Modifications. A modified intake would divert creek flows. A diversion pipe with a slide gate or other provision to control flows would be installed to divert flows into the aqueduct. Pumps would be used to bring water to the height of the intake structure. A generator (electric, gasoline, or diesel) would supply power to the pump. A temporary cutoff dam to prevent flows from continuing down the creek channel would be installed. The cutoff dam would be constructed from native gravels and cobbles or by installing continuous, interlocking sheetpiles. The cutoff dam would be high enough such that creek flows would naturally flow into the modified aqueduct intake structure if pumps were not used. In either case, native gravel and cobbles would be placed in the plunge pool (which would act as a detention basin) to form a low-height dam with a small, gated dewatering pipe. The dewatering pipe would prevent any turbid water produced at the worksite from entering Alameda Creek. It would also prevent any accidental fuel or oil spill from entering Alameda Creek. Oil-absorbent materials would be placed around the diversion pipe to further filter debris and prevent unwanted fines or contaminants from entering Alameda Creek.

The third option would consist of isolating one-half of Sunol Dam at a time, using a cofferdam to divert the creek around the demolition area. Installation of the cofferdam would be the first step. One end of the cofferdam would abut the left bank, and the other end would be at the midpoint on Sunol Dam. The next step would be to construct a gravel berm downstream of the dam, with two approximately 24-inch-diameter pipes through the berm to allow the creek to flow. The berm would allow access from the right bank to the left bank of the creek and dam. Step three consists of installing a cofferdam on the downstream face of the dam to completely isolate one-half of the dam for demolition. Pumps would dewater the isolated area for demolition activities and to address any groundwater infiltration. Water would be pumped into plastic-lined settling basins and discharged into the creek. This dam isolation procedure would then be repeated on the other half of Sunol Dam.

[3] A pneumatic hammer is a hammer driven by compressed air.

Dam Removal

A portion of the dam structure would be removed down to an elevation of approximately 194.4 feet[4] (from an elevation of approximately 220 feet), which is the calculated historic bed elevation. In addition, the top of the dam would be altered to create a sharp-crested weir by cutting an adverse slope across the dam width, from downstream to upstream. Should the dam crest become exposed over time, this alteration would reduce the risk of it acting as a fish barrier.

The left wing-wall would be removed down to the dam's crest. Portions of the left abutment would be removed such that the structure would not provide access to the area nor destabilize the slope. The existing aqueduct and manhole on the left abutment would be permanently plugged to prevent flows from entering downstream segments of the aqueduct. An excavator with a hydraulic hammer attachment would be used to break open this section of the aqueduct to allow placement of the concrete plug. On the right side, portions of the header box and right wing-walls would be removed and a steel grate or flap gate installed on the aqueduct to prevent trespassing. The plunge pool immediately downstream of the dam structure would be filled in with sediment (between 2,000 and 10,000 cubic yards [cy]) obtained from behind the dam after the dam has been removed.

Removal Methods

The demolition of Sunol Dam would be accomplished using one or more of the following methods. An excavator with a hydraulic hammer attached would be used to "jackhammer" the concrete. Heavy equipment access to the face of the dam would be required to remove the structure down to an elevation of approximately 194.4 feet (see Access and Roads, below). An excavator with a bulldozer would be used to construct the access route.

A second demolition option is the use of controlled blasting in conjunction with the excavator. Controlled blasting to fracture the dam face would occur in a sequence in which 3-foot layers of the dam would be targeted. Following a controlled blast, the excavator would remove the material, and then the next 3-foot layer would be prepared for controlled blasting and removal. Up to eight blasts might be necessary, conducted on up to eight different days. The actual controlled blast would last for a couple of seconds.

Sunol Dam would be prepared for controlled blasting by drilling approximately 1.5-inch-diameter holes into the dam in a particular pattern to be determined by the blasting specialist. The holes would be filled with a specified amount of explosive and wired for detonation. Once the area is prepared, a chain-link fence and a blast mat (rubber belting) would be placed over the area. Warning horns would sound before detonation. Blasting is usually over in a matter of seconds. It is estimated that it would take about three weeks to blast and remove approximately 1,200 cy of concrete.

The noise level for controlled blasting would be about 138 decibels (dB) at 50 feet for a few seconds; a vibrating hammer breaking concrete produces a noise level of 113 dB at 50 feet. The

[4] Final dam elevations (for both Sunol and Niles Dam) are ±3 inches.

peak particle velocity for controlled blasting would be approximately 1.25 inches/second for objects within 300 feet, which is below the level that poses a risk of damage to structures of 2 inches/second.

The third demolition method would involve the use of a chemical expansive agent (also referred to as "soundless chemical demolition agents" [SCDAs]). The main component of SCDAs is calcium oxide, which forms calcium hydroxide when water is added. SCDAs are powdery materials that expand considerably when mixed with water. After the SCDA is mixed, it is placed in boreholes drilled into the concrete. The boreholes are approximately 1 to 2 inches in diameter and spaced less than 2 feet apart. Depending on the type of SCDA, significant expansive pressure causes fracturing in between 15 minutes and 24 hours. The split concrete is removed by conventional methods. SCDAs do not generate noise, flying rock, vibration, or toxic fumes.

Access and Roads

General access to the Sunol Dam project site would be provided by an existing access road along the north side of Alameda Creek. Construction vehicles would travel through an adjacent nursery's internal roadway off of SR 84 to access this road, which is on land owned by the SFPUC and is not accessible to the public. The nursery's driveway is not fully improved, but is regularly used by trucks and private vehicles. The access road would be widened in areas where there are no mature trees and would allow trucks to be staged until they are needed to off-haul debris such as vegetation, concrete, and sediment.

There are two options for getting heavy equipment to the face of the dam, both of which are evaluated in this DEIR. The first option would be to construct an access ramp at the end of the existing access road leading to the dam. The temporary access ramp would be constructed at a 6 percent grade down to Alameda Creek. This option would initially require importing fill down to the channel, where native gravels and cobbles could be used to complete the ramp. The ramp would be built and then closed for the installation of the diversion pipe. Once the ramp has been completed, a heavy timber deck or imported gravels would be needed to get the equipment across the creek channel to access the gravel bars on the left side of the creek.

Temporary access from SR 84 could also be obtained by cutting an access road to the right bank of the creek (looking downstream). Vegetation in this area is sparse. A heavy timber deck would be placed across the creek underneath the Union Pacific Railroad (UPRR) bridge downstream of the dam structure. This option would allow heavy equipment to use the large, exposed gravel beds that extend up to the plunge pool to access the dam face. This access route could be provided in addition to the route described above.

Once heavy equipment has access to the gravel area, gravels and cobbles would be used to construct a "padded up" work area to get an excavator with a hydraulic hammer attachment up to the face of the dam structure.

The majority of traffic related to removal of the dams would involve trucks hauling debris. At the Sunol Dam site, up to 1,200 cy of material would be removed. If 10-cy-capacity trucks were used,

approximately 120 one-way truck trips would be generated. Given a three-month timeframe, approximately one truck trip per day[5] would exit from the site.

Demolition activities would include trips by work crews and dam removal equipment as well as trips to set up operations. The typical crew size would be 15 people, plus SFPUC inspectors for each site. Worker trips traveling to and from each worksite would be approximately 23 round-trips (46 one-way trips) per day, for a total of 46 round-trips (92 one-way trips) for both dams. The removal would occur in periodic activity peaks, requiring brief periods of considerable effort followed by longer periods of reduced activities.

Staging, Equipment and Materials Storage

The contractor's office, including employee parking and equipment and materials storage, would be located at the entrance to Sunol Dam's access road across from the old chlorine injection building, on land currently leased by a nursery. Employees would use this area to park vehicles and store personal belongings. Equipment could be left onsite at the end of each workday. If equipment and/or materials are to be left within Alameda Creek at the end of a workday or over a weekend during demolition activities, a containment system (e.g., temporary berms) would be installed around equipment and/or materials to prevent the accidental release of hazardous materials into Alameda Creek. In addition, secondary containment, such as a drain pan or drop cloth, to catch spills or leaks would also be used. Spill cleanup kits would be located onsite, and all diversion structures and pumps (if necessary) would be inspected before the end of the workday to ensure their proper functioning.

Impounded Sediment

The estimated volume of sediment behind Sunol Dam is 37,000 cy. After the dam is removed, sediment that is not used to fill in the downstream plunge pool or for general recontouring in the area would be left in place to move downstream naturally over a period of several decades.

The impounded sediments behind Sunol Dam were tested for hazardous materials. Selected samples from each of the seven vibracores[6] collected were submitted for laboratory testing, for both environmental (chemical analytical) and geotechnical (grain-size distribution) purposes. Polychlorinated biphenyls (PCBs), polynuclear aromatic compounds, pesticides, and total petroleum hydrocarbons (TPH) as motor oil were not detected in any of the samples. TPH as diesel was detected in two samples at low levels (1.2 milligrams per kilogram [mg/kg] and 1.1 mg/kg). Metals were detected at low concentrations—well below regulatory criteria for disposal. The detected concentrations were also below accepted background concentrations (except for one detection of nickel, which was just above background levels).

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[5] The actual result is 1.2 trucks, but this number was rounded to the nearest whole number.

[6] Vibracore sampling is a sediment sampling method in which the sampling pipe is "vibrated" downward instead of using the conventional method of drilling.

Site Restoration and Revegetation

Site restoration activities would be part of the project and would proceed as phases of dam removal are completed. Site restoration consists of two phases: the first phase involves restoring disturbed areas such as access roads. An erosion control plan would be implemented to winterize the site. The second phase involves revegetation (i.e., the planting of native trees and shrubs), which would be required due to changes in groundwater levels. This phase would commence a year or two following the completion of dam removal in the former backwater area of Sunol Dam. This delay in revegetation would allow the area to stabilize before planting.

Removal Schedule

Demolition and associated activities at the Sunol Dam project site are expected to occur between May and November of 2006. In-channel work would begin in June and conclude by October, unless otherwise authorized by the California Department of Fish and Game (CDFG). The schedule is approximately three months, within the windows noted above. The dams would be removed concurrently.

Niles Dam

Diversion/Dewatering of Alameda Creek

As with Sunol Dam, there are three methods to dewater the creek. The first option consists of installing a small cutoff dam at the upstream end of the proposed work area and installing an approximately 36-inch-diameter pipeline with flexible mechanical couplings below the dam. The pipeline might need to be moved as work progresses. Diverted water would be discharged below the work area, which would be isolated by a downstream cutoff dam.

A second option would be to construct a diversion channel or trench along the left bank of Alameda Creek.[7] The channel or trench would be lined with plastic sheeting to prevent seepage into the work area and to improve the flow capacity of the diversion channel. The channel would be designed to minimize the removal of trees and vegetation. A short segment of culvert would be installed near the upper end of the channel to allow equipment access across the diversion channel. Immediately downstream of where the diversion channel would connect to Alameda Creek, a continuous row of interlocking sheetpiles would be installed across the creek bank to cut off flow to the work area and to allow creek flows to enter the diversion channel. Immediately downstream of the sheetpiles, dewatering pumps would be installed to reduce and control the amount of water entering the worksite. These pumps would discharge into plastic-lined settling basins that would be constructed from the existing channel. The settling basins would be slightly higher than the diversion channel to allow for gravity flow into the channel. Similar sediment control features, such as silt fences, would be placed at the end of the settling basin to filter

[7] There appears to be an abandoned, or flood, channel about 30 feet from the left bank of Alameda Creek that could be excavated and used as a diversion channel; however, it is not known at this conceptual stage whether this channel could be used.

sediment and prevent fines from entering the diversion channel and subsequently Alameda Creek. The diversion channel would re-enter Alameda Creek just downstream of Niles Dam.

As with Sunol Dam, native gravel and cobbles would be placed downstream of Niles Dam to form a low-height dam with a small, gated dewatering pipe. The dewatering pipe would prevent any turbid water produced at the worksite from entering Alameda Creek. It would also prevent any accidental fuel or oil spill from entering Alameda Creek. Sediment control features and oil-absorbent materials would be placed around the diversion pipe to further filter debris and prevent unwanted fines or contaminants from entering Alameda Creek.

The third option consists of isolating one-half of Niles Dam, as described above for Sunol Dam, performing demolition work, and then isolating the other half of the dam for removal.

Dam Removal

Niles Dam would be lowered to an elevation of approximately 108.4 feet, which is the estimated historic pre-dam bed elevation and is 6.9 feet below the dam crest. However, the actual height of the dam is not known with certainty, and therefore the depth of removal could be greater than 6.9 feet. The limits of dam removal would be established during predemolition surveys. In addition, the left abutment would be removed in its entirety, and as much of the right abutment as geotechnically feasible would be removed. Portions of the right abutment are adjacent to SR 84. Between 200 and 800 cy of sediment stored behind Niles Dam would be used to fill in the downstream plunge pool.

Removal Methods

The removal of Niles Dam would be accomplished by one or more of the methods, as described under Sunol Dam, Removal Methods.

Installation of the diversion/dewatering system would be performed using small equipment. Installation of the sheetpiles would be accomplished by using an excavator fitted with a vibratory driving attachment. An excavator or small bulldozer would be needed to build up a work platform or deck above the waterline. Imported gravel would be required to create a work area immediately adjacent to the roadway and the beginning of the access ramp. Native gravel and cobbles from the creekbed could then be used to advance the work platform into the creek and complete the access ramp. As the platform is advanced, the excavator would vibrate the sheetpiles into place.

Access and Roads

Access to the Niles Dam site is limited because of its location. It lays perpendicular to SR 84, which has narrow or no shoulders. On the opposite bank, the railroad embankment rises approximately 150 feet away from the left abutment of Niles Dam. Two options are currently being considered to allow heavy machinery and ancillary equipment to access the site. Both options are evaluated in this DEIR.

Access via the Niles Canyon Railroad

The Niles Canyon Railroad (NCRR)[8] is located on the left side of the dam, downstream of the dam structure. The NCRR has a yard area in Sunol where equipment and debris could be handled. Initial conversations with the nonprofit NCRR organization indicate that using the NCRR is feasible as long as heavy equipment, either rubber-tired or track-mounted, would not cross the bridge immediately upstream of the dam site. All equipment would have to be loaded on flatbed cars and transported to the site. The railroad is approximately 35 feet higher than Alameda Creek at the dam site, requiring some form of heavy timber platform and access ramp to be installed.

Access via SR 84

SR 84 is a single-lane roadway in each direction with a few small shoulder areas for the length of the project area. It serves as part of the commute corridor between Sunol and Fremont. Peak traffic hours are during weekdays in the morning and evening. At the Niles Dam site, a rock retaining wall separates the roadway from the dam and Alameda Creek.

To use SR 84 for dam and debris removal, the eastbound lane would need to be closed to allow trucks to be staged and loaded. Flaggers and a pilot car would be needed at each end of the road control area to allow public vehicles to pass the construction site. In addition, signs as well as battery or solar flashing warning lights would need to be placed in the vicinity well in advance of the work; due to SR 84 conditions, extra signs and warning lights would need to be used.

The California Department of Transportation (Caltrans) has, and does allow for, limited road control during nonpeak times (i.e., during non-commute hours), and Caltrans closes sections of SR 84 each year (typically on Sunday) to remove vegetation and perform maintenance. To reduce the traffic impacts of using SR 84, the loading tasks would need to be scheduled during nonpeak hours and could occur on weekends. Caltrans would require a traffic control plan and would need to approve the plan before the start of construction.

It is estimated that approximately 800 cy of material would be removed from Niles Dam. If 10-cy-capacity trucks were used, approximately 80 one-way truck trips would be generated. Given a two-month timeframe, the proposed project would generate about two truck trips per day. For information on work crews, see Access and Roads under Sunol Dam, above.

Additional Access Considerations

Because of the proximity of Niles Dam to SR 84, there are other access considerations unique to the Niles Dam site. These are:

- Initial Access. Access for the initial staging of equipment into the project area, specifically onto the left bank of Alameda Creek, is critical to installing the diversion/dewatering systems.

- Frequent Access. Once the diversion equipment has been installed and is operational, daily access would be needed to get construction personnel and equipment to the site. Near-daily

[8] Shown on some figures as the "Southern Pacific Railroad."

access would be needed to refuel and maintain equipment. Biweekly access would be required to remove garbage and debris.

Staging, Equipment and Materials Storage

Due to site access issues at Niles Dam, the construction office and primary staging area would be at the same location as for the Sunol Dam. As with Sunol Dam, equipment and/or materials may be left onsite and/or within Alameda Creek. For further information, see Staging, Equipment and Materials Storage for Sunol Dam.

Impounded Sediment

Sediment stored behind Niles Dam is estimated to be 2,200 cy. As described for Sunol Dam, sediment would be left in place to move downstream naturally, except for the amount used to fill in the downstream plunge pool or used for general recontouring in the area after dam removal.

Field observations along with grain-size data for Niles Dam indicate that the sediments behind the dam are coarser than those at Sunol Dam. Given this information, and the poor recovery obtained in the vibracores at Sunol Dam, sediment sampling at Niles Dam was not attempted. Based on the results of the laboratory testing performed on sediments collected behind Sunol Dam, and on communications with the Alameda County Flood Control and Water Conservation District and Zone 7 Water Agency regarding dredging of Alameda Creek and Arroyo de la Laguna, the sediments impounded behind Niles Dam are likely free of potentially hazardous substances or have concentrations of such substances that are well below regulatory limits for disposal.

Site Restoration and Revegetation

See Site Restoration and Revegetation under Sunol Dam.

Removal Schedule

Demolition and associated activities at the Niles Dam project site are expected to occur between May and November of 2006. In-channel work would begin in June and conclude by October, unless authorized by the CDFG. The schedule is approximately two months, within the windows noted above.

C. Environmental Impacts and Mitigation

Chapter IV of this DEIR presents a description of the existing environmental setting and an analysis of environmental impacts. The impact analysis indicates that not all of the identified environmental impacts can be mitigated to a less-than-significant level. There would be significant, unavoidable adverse impacts associated with removal of the dams. Impacts are identified as "Significant Unavoidable Impact," "Significant Impact, Can Be Mitigated," "Potentially Significant Impact, Can Be Mitigated," "Less than Significant Impact," or "Beneficial Impact." Table 1, located at the end of this chapter, presents a summary of the identified impacts.

For all significant or potentially significant impacts, Chapter V of the DEIR presents mitigation measures that would reduce impacts to a less-than-significant level, except for impacts on historical resources, which would remain significant and unavoidable. Measures are described in two categories: those already included as part of the proposed project, and those identified in the EIR. The SFPUC would determine what mitigation measures it would adopt before certification of the Final EIR. In addition, the DEIR recommends improvement measures, if applicable, to reduce disruption or minor adverse effects of the proposed project, but these measures are not required to reduce impacts to a less-than-significant level. A brief summary of the mitigation measures that would reduce impacts to less than significant is presented below.

In addition to mitigation measures, this chapter describes recommended improvement measures for some impacts that were identified as less than significant in Chapter IV, Environmental Setting and Impacts. Improvement measures were identified as a result of the analysis contained herein. These improvement measures, while not required under CEQA to mitigate identified significant impacts, could reduce minor adverse effects or temporary disruption associated with implementation of the proposed project.

In addition to mitigation measures, BMPs are also included in some of the mitigation measures. BMPs are standard methods, measures, or practices such as structural and nonstructural controls or operation and maintenance procedures. The BMPs noted herein should be viewed as a menu of options from which the SFPUC may select to address a particular set of problems. In addition, other BMPs may be employed by the SFPUC to address site-specific demolition effects; therefore, not all of the possible BMPs are listed.

Compatibility with Existing Zoning and Plans

No significant or potentially significant impacts were identified, and no mitigation is required.

Transportation, Circulation, and Parking

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified a BMP for traffic control. The measure is as follows:

> Construction signs would be posted at job sites warning the public of construction work and to exercise caution. When necessary, a person would be provided for traffic control. A lane may be blocked off to allow trucks to pull into and out of the access points.

Mitigation Measures Identified in this DEIR

The mitigation measure focuses on reducing short-term traffic impacts during dam demolition activities; mitigation measures for long-term impacts are not needed.

B-1 The SFPUC will prepare and implement a traffic control plan in coordination with Caltrans and the City of Fremont for all affected roadways and intersections. The traffic control plan will comply with the requirements outlined in Caltrans and City of Fremont encroachment permits. The traffic control plan will include, but not be limited to, the following measures:

- The SFPUC will install advance warning systems and flaggers on SR 84 at the access points. At Sunol Dam, the flaggers will create gaps in traffic to allow trucks to pull out of the nursery driveway, where sight-distance would be an issue. At Niles Dam, the flaggers will limit traffic to one-way flag controlled traffic to allow sufficient width for trucks to pull on and off of the roadway.
- The SFPUC will schedule project work and restrict construction vehicles to nonpeak traffic periods (i.e., 9:00 a.m. to 4:00 p.m. and 8:00 p.m. to 4:00 a.m.) to avoid peak-hour traffic on SR 84.
- The SFPUC will install advance warning signs and speed controls on SR 84 to achieve required speed reductions for safe traffic flow past the dam access points.
- The SFPUC will include advance warning signs and/or detours for bicyclists near the dam access points on SR 84.
- The SFPUC will install advance warning signs if blasting is used. Traffic may be stopped temporarily when blasting occurs.

Improvement Measures

The following measure is recommended to further reduce the less-than-significant impact of wear and tear on access points.

The SFPUC will inspect roadways affected by the project prior to and after demolition and, if roadway damage is detected, enter into an agreement with local jurisdictions for implementing a post-construction roadway repair/rehabilitation program. At a minimum, roads damaged by demolition activities will be repaired to a structural condition equal to that, which existed prior to demolition activity.

Utilities and Public Services

The mitigation measure identified below would reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 32) identified the following mitigation measure:

Additional samples will be collected from the excavated/stockpiled materials[9] and tested[10], before off-hauling any of the materials. The final destination of the materials will depend on the results of the additional testing.

Mitigation Measures Identified in this DEIR

No additional significant or potentially significant impacts have been identified, and no mitigation is proposed.

Biological Resources

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified BMPs for fishery and aquatic resources. These measures are as follows:

> Temporary fills, such as for access ramps, diversion structures, or cofferdams, will be completely removed upon finishing the work.
>
> Pump intakes are screened with mesh equal to or less than 3/16 inch to prevent uptake of fish or frogs.[11]
>
> In general, work is performed from the spring to fall months when low flows are present in the channels. Work is typically completed by October 15 of any year unless permission from the California Department of Fish and Game (CDFG) is received allowing work to continue past this date. By performing work during this period, effects to water quality and aquatic habitats are avoided or minimized.

The Initial Study (see Appendix A, p. 32) identified the following mitigation measure:

> Post-project revegetation will replace the Alameda whipsnake habitat disturbed during dam removal activities.[12]

Mitigation Measures Identified in this DEIR

D-1 **Measure to protect special-status plants.** Before clearing and grubbing activities occur within the project area, a qualified botanist will perform appropriately timed botanical surveys to determine the presence or absence of special-status plant species. If special-

[9] The "materials" to be sampled is the sediment removed from behind the dams for off-hauling.

[10] Samples will be analyzed for gasoline, diesel, motor oil, semi-volatile organics, pesticides, PCBs and Cam 17 metals.

[11] Screen size is based on criteria from the National Marine Fisheries Service.

[12] This mitigation measure is for Niles Dam.

status plants are discovered in the project area, individuals will be clearly marked and avoided during dam removal to the extent feasible. Otherwise, the SFPUC will obtain the necessary permits for impacts to the plant species.

D-2a **Avoidance of jurisdictional features.** The final design will avoid temporary and permanent impacts to jurisdictional features to the extent feasible. If avoidance is infeasible, implementation of Measures D-2b through D-2e would reduce the impacts to a less-than-significant level.

D-2b The SFPUC will implement standard BMPs to maintain water quality and control erosion and sedimentation. See "Mitigation Measures Proposed as Part of the Project" under Hydrology, Groundwater, and Water Quality, below.

D-2c Dam removal activities within jurisdictional features will require permit approval from the U.S. Army Corps of Engineers (Corps) for fill of wetlands and other waters of the U.S. pursuant to Section 404 of the Clean Water Act (CWA). Water quality certification from the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) will also be required pursuant to Section 401 of the CWA. In addition, the CDFG has jurisdiction pursuant to Section 1602 of the Fish and Game Code. Dam removal work at Sunol and Niles dams will require a Streambed Alteration Agreement from the CDFG. Terms and conditions of the permits will include measures to protect and maintain water quality, restore worksites, and mitigate for temporary and permanent wetland impacts.

D-2d The SFPUC will restore all jurisdictional features temporarily disturbed during dam removal activities to pre-project conditions, as described in the Corps-verified wetland delineation map and report. A qualified biologist/ecologist will prepare a wetland mitigation and monitoring program to be reviewed and approved by the Corps and SFBRWQCB. Monitoring of restored areas will be required for a minimum of five years. The wetland mitigation and monitoring program will include specific performance criteria, monitoring methods, timing of annual reports, and conditions for remedial action if plan criteria are not met. SFPUC will be responsible for ensuring that the restoration plan is implemented.

D-2e The SFPUC will replace all jurisdictional features permanently disturbed during dam removal activities through compensatory mitigation. The final ratio will be negotiated by resource agencies and specified in regulatory permits issued for the project.

D-3 **Measures to reduce impacts to *O. mykiss* and Pacific lamprey.** The SFPUC will implement the following measures to reduce direct and indirect impacts to *O. mykiss* and Pacific lamprey:

Before dam removal activities commence, the following measures will be implemented:

- Before diversion/dewatering and dam removal activities, a NMFS-approved biologist will conduct fish relocation activities, and immediately release captured fish to a suitable habitat near the project site.

- A plan describing pre-project conditions and restoration methods of disturbed areas will be prepared by a qualified biologist, reviewed, and approved by the CDFG (see Mitigation Measure D-9a).

During dam removal activities, the following measures will be implemented:

- In-stream dam removal activities will be restricted to low-flow periods (May through October) unless authorized by the NMFS.

- Sediment curtains will be placed downstream of the dam-removal area to prevent sediment, which could be disturbed during diversion/dewatering and dam removal activities, from being transported and deposited outside of the project area.

- Dewatering pumps will be screened according to NMFS fish screening criteria for anadromous salmonids. A qualified biologist will be onsite during initial dewatering activities to ensure that any fish that may have remained within the project area are relocated to suitable habitat near the project area.

- Silt fencing will be installed in all areas where construction occurs within 100 feet of known or potential *O. mykiss* and Pacific lamprey habitat.

- A spill prevention plan for potentially hazardous materials will be prepared and implemented by the SFPUC. The plan will include proper procedures for handling and storing potentially hazardous materials, as well as for cleaning up and reporting any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channel.

- Most equipment and materials will be stored at least 50 feet from Alameda Creek and the bypass channel, if one is constructed. If equipment and/or materials are to be left within Alameda Creek at the end of a workday or over a weekend during demolition activities, temporary containment berms will be constructed around such equipment and/or materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents will be located outside of the stream channel and banks. Stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the stream will be positioned over drip pans or excavated areas with plastic lining to contain potential spills. Any equipment or vehicles driven, operated within, or adjacent to Alameda Creek will be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life. Vehicles will be moved at least 50 feet away from the stream before refueling and lubrication, when feasible. No debris such as trash and spoils will be deposited within 50 feet of Alameda Creek, the bypass channel, or wetlands.

- Proper and timely maintenance for vehicles and equipment used during dam removal activities will be performed to reduce the potential for mechanical breakdowns to lead to a spill of materials into or near the creek. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creek).

- A qualified biological monitor will be onsite during all diversion/dewatering activities. The biological monitor will advise the resident engineer to halt construction if impacts on *O. mykiss* or Pacific lamprey are evident.

After dam removal activities are completed, the following measures will be implemented:

- The SFPUC will restore areas disturbed during dam removal activities with an appropriate assemblage of native vegetation suitable for the area. Channel banks will be returned to original grade slope, and appropriate bank stabilization techniques will be implemented to reduce the potential for erosion and sedimentation (se Mitigation Measure D-9a).

D-4a Measures to minimize and avoid impacts on California red-legged frog and foothill yellow-legged frog habitat. Measures to minimize and avoid the incidental take of California red-legged frog (CRLF) are derived from the Programmatic Biological Opinion (PBO) for impacts to CRLF and will also provide suitable protection to foothill yellow-legged frogs. Although it is unlikely that the project will be covered under the PBO, the PBO summarizes typical effects that could occur as a result of the proposed project and provides general preventive measures that will substantially reduce the risk of incidental take of CRLF.

Before dam removal activities commence, the following measures will be implemented:

- The name and credentials of a biologist qualified to act as construction monitor will be submitted to the U.S. Fish and Wildlife Service (USFWS) for approval at least 15 days before commencement of work.

- A USFWS-approved biologist will survey the worksites two weeks before the onset of removal activities. If CRLF, tadpoles, or eggs are found, the approved biologist will contact the USFWS to determine if moving any of these life-stages is appropriate. If the USFWS approves moving the animals, the approved biologist will be allowed sufficient time to move frogs from the worksites before work activities begin. If CRLF are not identified, demolition may proceed at these sites.

- All work activities within or adjacent to potential CRLF aquatic habitat will be completed between May 1 and November 1 (with the concurrence of the CDFG, which typically requires in-stream work to be completed by October).

- Exclusionary fencing (i.e., silt fences) will be installed around all project areas that are within 100 feet of or adjacent to potential CRLF habitat.

- A USFWS-approved biologist will conduct a training session for all dam removal personnel. At a minimum, the training will include a description of CRLF and its habitat, the importance of CRLF and its habitat, general measures that are being implemented to conserve CRLF as such measures relate to the project, and the boundaries within which dam removal activities will occur.

- A plan describing pre-project conditions and restoration methods of disturbed areas will be prepared by a qualified biologist, reviewed, and approved by the CDFG (see Mitigation Measure D-9a).

During dam removal activities, the following measures will be implemented:

- A USFWS-approved biologist will be present at active worksites until such time that the removal of CRLF, instruction of workers, and habitat disturbance have been completed. After this time, the contractor or permittee will designate a person to monitor onsite compliance with all minimization measures. The USFWS-approved biologist will ensure that this individual receives training as outlined in the PBO.

- During work activities, all trash that may attract predators will be properly contained, removed from the worksite, and disposed of regularly. Following dam removal, all trash and construction debris will be removed from work areas.

- A spill prevention plan for potentially hazardous materials will be prepared and implemented as recommended under the discussion for *O. mykiss*.

- All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 50 feet away from any riparian habitat or water body (see the mitigation measure recommended for *O. mykiss*).

After dam removal activities are completed, the following measures will be implemented:

- The SFPUC will restore areas disturbed during dam removal activities with an appropriate assemblage of native vegetation suitable for the area. Channel banks will be returned to original grade slope, and appropriate bank stabilization techniques will be implemented to reduce the potential for erosion and sedimentation (see Mitigation Measure D-9a).

- Monitoring. The SFPUC will monitor the pond adjacent to the Sunol Dam access road for the first two years after dam removal to determine the effects of lowering groundwater levels on CRLF. Monitoring will include protocol habitat assessment for CRLF. The monitoring area will include the pond and the project reach of Alameda Creek.

    - Monitoring methods will include assessment of aquatic breeding habitat for CRLF and may include but is not limited to:

        a. Pond water depth and duration

        b. Vegetation occurring within the pond and Alameda Creek

        c. Observation of species in the pond and Alameda Creek

        d. Pond and creek water temperature

    - Monitoring reports will be submitted to the regulatory agencies for each of the first two years after dam removal. If after the first two years aquatic habitat for CRLF is diminished in the pond, subsequent monitoring or mitigation at a ratio 1.1:1 may be applied.

    - Monitoring will also include Alameda Creek within the project reach. If, as anticipated, potential aquatic breeding habitat for CRLF is created as a result of dam removal activities, this habitat creation may provide

suitable mitigation if there is a permanent loss of aquatic breeding habitat in the pond.

- Mitigation. If monitoring of the CRLF pond and project reach of Alameda Creek indicates project-related changes (i.e., groundwater lowering), the SFPUC will consult with the USFWS to determine the need for additional mitigation. Such mitigation may include the restoration or enhancement of CRLF habitat on lands currently owned by the SFPUC. The map prepared as part of the proposed SFPUC Habitat Conservation Plan illustrates that sufficient CRLF habitat exists within the Alameda Creek watershed if additional mitigation is required. Such mitigation will be provided at a minimum 1.1:1 ratio.

D-4b **Consultation with USFWS.** The SFPUC will consult with the USFWS to establish additional reasonable and prudent measures to avoid CRLF take and mitigation for temporary and permanent impacts to CRLF habitat. These measures will be implemented in addition to those measures implemented under Measure D-4a.

D-5 **Measures to reduce impacts to western pond turtles and their habitat**. Before diversion/dewatering and dam removal activities occur, a qualified biologist will perform pond turtle surveys within 300 feet of the dam removal areas. Surveys will include nests and eggs in addition to adult and subadult individuals. The biologist will be responsible for the survey, for relocating adult turtles if they are found, and for relocating turtles that move into the dam removal zone after dam removal has begun. Dam removal will not proceed until the area is determined to be free of turtles and their nests.

In addition to the preconstruction survey for turtles, Mitigation Measures D-4a and D-4b (to minimize impacts on CRLF), including the presence of an onsite monitoring biologist, will provide effective protection for western pond turtles.

D-6 **Measures to protect Alameda whipsnake.** The SFPUC will conduct preconstruction surveys and employee sessions. Biological monitors will be onsite to identify and relocate any Alameda whipsnakes that come into the Niles Dam project area. If feasible, the work area will be isolated from entry by this species using exclusionary fencing or other appropriate means approved by the USFWS.

D-7a **Measures to protect nesting and breeding birds and raptors.** The following mitigation measures will be implemented to address potential impacts to nesting and breeding birds and raptors in the vicinity of the proposed project. To the extent feasible, removal activities will avoid the nesting season (between March 15 and August 15). If dam removal must occur during this period, the project area will be surveyed before dam removal by a qualified biologist to verify the presence or absence of nesting birds or raptors. If the survey indicates the potential presence of nesting birds or raptors, the results will be coordinated with the CDFG, and suitable avoidance measures will be developed and implemented. Dam removal will observe the CDFG avoidance guidelines, which require buffer zones around active raptor nests and nests of other birds, as specified by the CDFG. Buffer zones will remain until young have fledged. If it appears

that demolition activities may cause nest abandonment, demolition activities must cease until the young are able to fly well enough to avoid demolition areas.

D-7b **Measures to protect nesting great blue heron.** Before clearing and grubbing activities at Sunol Dam, a qualified biologist will conduct preconstruction surveys to determine if acting nesting is occurring at the observed nest site. If nests are observed, then a buffer will be created around the rookery, and no dam removal activities will occur within the buffer zone until young have fledged. If it appears that demolition activities may cause nest abandonment, demolition activities must cease until the young are able to fly well enough to avoid demolition areas.

A noise level of no greater than 85 decibels will be enforced at the heron rookery, approximately 800 feet upstream of the dam. This parameter may be met through a variety of standard noise-reducing procedures for construction equipment (also see Appendix A, page 19, BMP 14). Contract specifications will include requirements for the use of blasting methods, including qualifications for the blasting contractor, the use of noise control methods and threshold noise levels, transportation and storage of explosives, safety considerations, and other limitations. The specifications will also require the submittal of a blasting plan by the contractor; this plan will cover the proposed noise control techniques, blasting charge size and limits, and hours of blasting.

D-8 **Measure to protect San Francisco dusky-footed woodrat.** A qualified biologist will conduct preconstruction surveys for woodrats before site clearing and grubbing activities. If active stick houses are observed, exclusionary fencing (i.e., silt fencing) will be installed around all project areas that are within 100 feet of active nests. If removal of inactive stick nests is required, a qualified biologist will monitor the removal. If a nest cannot be avoided, then live traps will be set at nest sites to trap and remove woodrats from the anticipated work area.

D-9a **Restore temporary loss of habitat.** The project includes the restoration of disturbed areas created by demolition-related activities such as the construction of access roads. Grassland/shrub habitat will be restored to pre-project conditions with native vegetation. All riparian woodland areas disturbed or removed during dam removal activities will be restored to pre-project conditions. The final project design will avoid impacts to riparian habitat within the Alameda Creek corridor to the extent feasible. The SPFUC will consult with a qualified biologist/arborist to develop a restoration and monitoring plan that will be approved by the permitting agencies. Once the project reaches the design phase and before the start of construction, a qualified biologist or arborist will count, identify the species, and map the trees within the construction footprint. Upon completion of dam removal activities, the SFPUC will replace trees removed or destroyed at a minimum 1.1:1 or other appropriate ratio, as agreed on by the regulatory agencies. The replacement trees will be native tree species. Restored areas will be monitored for a minimum of five years. The restoration and monitoring plan will include specific performance criteria, monitoring methods, timing of annual reports, and conditions for remedial actions if plan

criteria are not met. The SFPUC will be responsible for ensuring that the restoration plan is implemented. See also Mitigation Measure F-1b.

D-9b **Revegetate with native trees and shrubs.** Dam removal activities will result in lowered groundwater levels and could remove backwater areas within the active stream channel. Some riparian vegetation could be temporarily lost as groundwater levels and sediment distribution adjust to the new conditions. However, riparian vegetation is expected to recolonize along the new stream channel. A mitigation and monitoring plan targeting the riparian areas will be developed, and the plan will be approved by the permitting agencies. As conditions stabilize, the recolonization of riparian habitat will be monitored by a qualified biologist/ecologist. If necessary, revegetation (i.e., planting) will be implemented to facilitate the recolonization or re-establishment of riparian vegetation along the creek channel. Riparian habitat areas will be monitored for a minimum of five years. The mitigation and monitoring plan will include specific performance criteria, monitoring methods, timing of annual reports, and conditions for remedial actions if plan criteria are not met. The SFPUC will be responsible for ensuring that the revegetation plan is implemented.

D-10 **Measures to protect bats.** Before clearing and grubbing activities, a qualified biologist will conduct preconstruction surveys for the bats. If active roosts are observed, a buffer will be placed around the roosts, and no dam removal activities will occur within the vicinity of the roosts. If it appears that demolition activities may cause nest abandonment, demolition activities must cease until the young are able to fly well enough to avoid demolition areas.

Geology, Soils, and Seismicity

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Identified in this DEIR

E-1 The SFPUC will adopt standard construction and engineering practices, which will require winterizing the construction sites and protecting exposed soil during heavy rainfall. In addition, the SFPUC will implement BMPs (see Appendix A, p. 19) to minimize disturbance to embankments and all areas surrounding the dams and impoundment. These practices will include adopting a plan of action to minimize heavy equipment traffic around the dams and anywhere along the creek banks. Any stockpiling of sediment or other unconsolidated material will be appropriately protected from runoff into the creek. Draining of excavated sediment will ensure that runoff does not enter the creek until the discharge is below or meets regulatory discharge thresholds for surface water releases to streams. Discharge limits include the latest regulatory threshold concentrations for parameters such as turbidity, specific conductance, and total dissolved solids. Discharge limits would be set forth, as required, in the State Water Resources

Control Board's (SWRCB) General Permit for Construction Activities (see the Initial Study BMPs for Hydrology, Groundwater, and Water Quality, below).

E-2 During the final design phase of the dam removal project, SFPUC engineers will determine the extent to which the abutments can be safely removed without triggering slope failure or destabilizing the slopes. For Sunol Dam, the SFPUC will leave enough of both abutments to ensure structural integrity. Special consideration will be given to the bedrock integrity above the left abutment. In the case of Niles Dam, the left abutment might be entirely removed and the right abutment partially left in place to provide sufficient stability to protect the integrity of SR 84. The SFPUC will develop design criteria using standard geotechnical engineering practices to ensure that the stability of the bedrock slopes and abutments is maintained following the dam removal.

Hydrology, Groundwater, and Water Quality

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified BMPs for channel diversion/dewatering and water quality protection. These measures are as follows:

Diversion structures will be constructed. Water will be discharged in a non-erosive manner (e.g., on gravel or vegetated bars, hay bales, plastic, etc.). Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows). Water diversion structures allow the SFPUC to isolate the work area, thereby avoiding or minimizing downstream water quality impacts. If earth is used, the downstream and upstream faces may be covered by a protected covering (e.g., plastic or fabric) to minimize erosion.

In conjunction with diversion structures, pumps or gravity-fed pipe systems are used to dewater sites.

If high levels of groundwater in a work area are encountered, the water is pumped out of the worksite. If necessary, the water will be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment before the water re-enters a creek.

When diversion structures are removed, to the extent practicable, the ponded flows will be directed into the low-flow channel within the worksite.

Silt barriers, such as filter rolls, fiber coirs, silt fences/curtains, or basins, or other effective devices[13] are installed, as necessary, downstream of the worksites.

Wet sediments may be stockpiled (outside of a live stream) so water can drain or evaporate before removal to minimize water quality impacts. Water is not allowed to drain directly

[13] Based on a comment from the SFBRWQCB, straw bales have been replaced with filter roles, fiber coirs, or other effective filtration devices.

into channels (outside of the work area) or onto city streets without providing water quality control measures.

No fueling, cleaning, or maintenance of vehicles or equipment takes place within channel banks to avoid the release of deleterious substances into surface waters. Inspection for leaks will take place on all equipment using fuel or requiring fluids on a daily basis.

Trucks may be lined with an impervious material (e.g., plastic), or the tailgate blocked with dry dirt or haybales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out. Water is not allowed to drain directly into channels (outside of the work area) or onto city streets without providing water quality control measures.

Streets are cleaned of mud and/or dirt by street sweeping, as necessary, and not by hosing down the street.

In addition, the Initial Study (see Appendix A, p. 32) contained a mitigation measure for sediment quality (see Utilities and Public Services, above).

Mitigation Measures Identified in this DEIR

Degradation of Water Quality During Dam Deconstruction

F-1a The project applicant will prepare a stormwater pollution prevent plan (SWPPP) prior to construction activities, as required by the SWRCB General Permit for Construction Activities. Implementation of the plan starts with the commencement of demolition-related activities and continues though the completion of the project. Upon completion of the project, the sponsor must submit a Notice of Termination to the SWRCB to indicate that demolition is completed. At a minimum, this plan will include the following requirements:

- Dam removal activities are scheduled to occur between May and November, with in-channel work scheduled to occur between June and October. This schedule will reduce the potential for erosion and surface runoff from rainfall events, among other potential impacts that could result from work during higher flow/precipitation months.

- In the unlikely event that demolition does occur during a wet period, runoff from the project area will be regulated through a stormwater management/erosion control plan that should include provision for silt traps/basins, grading of surface flows to silt traps, and covering of loose material or stockpiles to divert runoff. Sediment basin/traps will be located and operated to minimize the amount of offsite sediment transport. Any trapped sediment will be removed from the basin or trap and placed at a suitable location onsite, away from concentrated flows, or removed to an approved disposal site.

- BMPs selected and implemented for the project will be in place and operational prior to the onset of major earthwork on the site. The construction phase facilities will be maintained regularly and cleared of accumulated sediment as necessary.

- Hazardous materials such as fuels and solvents used on the construction sites will be stored in covered containers and protected from rainfall, runoff, accidental spill, and vandalism. A stockpile of spill cleanup materials will be readily available at all construction sites. Employees will be trained in spill prevention and cleanup, and individuals will be designated as responsible for prevention and cleanup activities.

- Refueling and maintenances of vehicles will be conducted outside of the creek floodplain wherever practicable. All refueling or maintenance activities should include secondary containment.

F-1b In addition to SWPPP requirements, the SFPUC will also detail a site restoration plan for the vicinity of the dams, including removal of equipment access ramps and restoration of affected slopes to minimize bank erosion. The SFBRWQCB will be responsible for reviewing and approving the plan. Minimum requirements of this plan include:

- All ramps into the worksites will be removed, and as near to natural a floodplain as possible re-established to prevent excessive bank erosion during high flow events. Grading around the remaining abutments will be performed with flood stages in mind, and all earth fill will be sufficiently armored against scour to protect remaining abutments from excessive erosion and exposure during flood flows.

- Temporary erosion control measures will be provided until restoration landscaping is established and can minimize discharge of sediment into Alameda Creek. Filter rolls, fiber coirs, or other effective devices will be placed adjacent to the water body.

- After the completion of grading, erosion protection will be provided on all disturbed slopes. Restoration will be facilitated by mulching, hydroseeding, or other methods and will be initiated as soon as possible after completion of grading and prior to the onset of the rainy season (by November 1).

- Permanent restoration/landscaping will emphasize drought-tolerant perennial ground coverings, shrubs, and trees to improve the probability of slope and soil stabilization without adverse impacts to slope stability due to irrigation infiltration and long-term root development.

F-1c In addition to compliance with applicable regulatory agency requirements set forth by the SFBRWQCB regarding disposal of waters discharged from site diversion/dewatering activities, the SFPUC will prepare a dewatering plan that will incorporate applicable discharge regulations and provide contractors with guidance on surface water and groundwater discharge during demolition activities. The dewatering plan will become part of the project.

Historical Resources

Impacts on architectural resources due to demolition of the historical dams cannot be mitigated to a less-than-significant level, even with implementation of Mitigation Measures G-1a and G-1b. However, the mitigation measures identified below would reduce impacts on other historical resources to a less-than-significant level.

Mitigation Measures Identified in this DEIR

G-1a Prior to the demolition of Sunol and Niles Dams, the SFPUC will retain a qualified architectural historian who will document Sunol and Niles Dams in accordance with the Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) standards. Pursuant to Section 110(b) of the National Historic Preservation Act, final HABS and HAER documentation will be submitted to the Northwest Information Center, Sonoma State University, the California Historical Resources Information System, the History Room in the San Francisco Public Library, and the Major Environmental Analysis section of the San Francisco Planning Department. The recordation of Sunol and Niles Dams to HABS/HAER standards, or other treatment measures, does not mitigate to a less-than-significant level the impact caused by demolition of a historical resource (14 California Code of Regulations Section 15126.4[b]); therefore, a significant unavoidable impact remains.

G-1b Before the removal of Niles Dam, the SFPUC will retain a qualified archaeologist to prepare and submit to the San Francisco Planning Department's Environmental Review Officer (ERO) for review and approval an Archaeological Research Design/Data Recovery Plan (ARD/DRP), prepared in accordance with State Historic Preservation Office guidelines for archaeological research designs. The principal objective of the ARD/DRP will be to delineate the assumptions, principles, and rules to be followed during the dam's removal. The ARD/DRP will identify the means necessary to preserve the defining characteristics of the resource, Vallejo Dam and Aqueduct, in terms of eligibility for listing in the National Register of Historic Places (NRHP)/California Register of Historical Resources (CRHR). Methods to preserve the context during the dam's removal include, but are not limited to:

- Documentary preservation of the scientifically consequential information regarding the location, method of construction, use of materials, purpose and function, and level of workmanship
- Identification of the important questions within the historical context that can be answered during the removal of Niles Dam (e.g., how the original diversion structure fit with the water conveyance system as a whole, and why this site was selected for this particular use)
- Recovery of data sets needed to respond to identified scientific questions, or recovery of those features that convey the significance of the resource under Criteria A and B
- Gathering of information during demolition to allow the reconstruction of how the structure looked in the past

Furthermore, the ARD/DRP will determine the conditions that need to be met to allow the full-scale demolition of the dam to be completed. That is, the ARD/DRP will state that, when the scientifically consequential information has been gathered to the

satisfaction of the ERO and the consulting archaeologist, the removal of the dam can proceed unabated.

Upon completion of the objectives outlined in the ARD/DRP, a Niles Dam archaeological resources report will be completed. The archaeological consultant will submit a draft report to the ERO that includes the original ARD/DRP, the results of the implementation of the research design, and copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the NRHP/CRHR. Information that may put at risk any archaeological resource will be provided in a separate removable insert within the draft report.

Copies of the draft report will be sent to the ERO for review and approval. Once approved by the ERO, copies of the report will be sent to the California Archaeological Site Survey, Northwest Information Center (NWIC).

G-2a The SFPUC will retain the services of a qualified archaeological consultant having expertise in California prehistoric and historical archaeology to undertake an archaeological monitoring program. All plans and reports prepared by the consultant as specified herein will be submitted first to the ERO for review and comment. Archaeological monitoring and/or data recovery programs required by this measure could suspend demolition for up to a maximum of four weeks. At the direction of the ERO, the suspension of demolition can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less-than-significant level potential effects on a significant archaeological resource, as defined in CEQA Guidelines Section 15064.5(a)(c).

The archaeological monitoring program will, at a minimum, include the following provisions:

- The archaeological consultant, SFPUC, and ERO will meet and consult on the scope of the archaeological monitoring program reasonably prior to the commencement of any project-related soil-disturbing activities. The ERO, in consultation with the project archaeologist, will determine what project activities will be monitored. In most cases, any soil-disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, or pile driving (foundation, shoring, etc.), will require archaeological monitoring because of the potential risk these activities pose to archaeological resources and to their depositional context.

- The archaeological consultant will advise project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource.

- The archaeological monitor(s) will be present on the project site according to a schedule agreed upon by the archaeological consultant and the ERO, until the ERO has, in consultation with the archaeological consultant, determined that project construction activities could have no effects on significant archaeological deposits.

- The archaeological monitor will record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis.

- If an intact archaeological deposit is encountered, all soil-disturbing activities in the vicinity of the deposit will cease. The archaeological monitor will be empowered to temporarily redirect demolition crews and heavy equipment until the deposit is evaluated. The archaeological consultant will immediately notify the ERO of the encountered archaeological deposit. The archaeological consultant will, after making a reasonable effort to assess the identity, integrity, and significance of the encountered archaeological deposit, present the findings of this assessment to the ERO.

If the ERO, in consultation with the archaeological consultant, determines that a significant archaeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the SFPUC either:

- The proposed project will be redesigned so as to avoid any adverse effects on the significant archaeological resource; or

- An archaeological data recovery program will be implemented, unless the ERO determines that the archaeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

If an archaeological data recovery program is required by the ERO, the archaeological data recovery program will be conducted in accordance with an archaeological data recovery plan (ADRP). The project archaeological consultant, SFPUC, and ERO will meet and consult on the scope of the ADRP. The archaeological consultant will prepare a draft ADRP that will be submitted to the ERO for review and approval. The ADRP will identify how the proposed data recovery program will preserve the significant information the archaeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes will address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods will not be applied to portions of the archaeological resources if nondestructive methods are practical.

The ADRP will include the following elements:

- Field Methods and Procedures. Description of proposed field strategies, procedures, and operations.

- Cataloguing and Laboratory Analysis. Description of selected cataloguing system and artifact analysis procedures.

- Discard and Deaccession[14] Policy. Description of and rationale for field and post-field discard and deaccession policies.

- Interpretive Program. Consideration of an onsite/offsite public interpretive program during the course of the archaeological data recovery program.

- Security Measures. Recommended security measures to protect the archaeological resource from vandalism, looting, and non-intentionally damaging activities.

- Final Report. Description of proposed report format and distribution of results.

- Curation. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession[15] policies of the curation facilities.

Human Remains, Associated or Unassociated Funerary Objects.[16] The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity will comply with applicable state and federal laws, including immediate notification of the Alameda County coroner and, in the event of the coroner determines that the remains are Native American remains, notification of the Native American Heritage Commission (NAHC), which will appoint a Most Likely Descendant (MLD) (Public Resources Code Section 5097.98). The archaeological consultant, SFPUC, and MLD will make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, curation, possession, and final disposition of the human remains and associated or unassociated funerary objects.

Final Archaeological Resources Report. The archaeological consultant will submit a draft final archaeological resources report (FARR) to the ERO that evaluates the historical significance of any discovered archaeological resource and describes the archaeological and historical research methods employed in the archaeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource will be provided in a separate removable insert within the draft FARR.

Copies of the draft FARR, along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the NRHP or CRHR, will be sent to the ERO for review and approval. Once approved by the ERO, copies of the FARR will be sent to the NWIC.

[14] Deaccession describes the disposal of an artifact.

[15] A unique descriptor for a particular artifact or object for record keeping purposes.

[16] Either associated with the burial or not associated with the burial; that is, buried as religious or ceremonial significance given the individual's status in society.

G-2b Prior to the commencement of ground-disturbing activities, dam removal personnel will receive environmental training in a manner that will inform all personnel of the possibility of encountering historical resources.

All construction personnel involved in activities that may uncover prehistoric resources will be trained in the identification of prehistoric resources, which could include flaked stone, projectile points, mortars, pestles, soil containing shell or bone, or human burials. Historical resources could include stone or adobe foundations or walls, structures and remains with square nails, and refuse deposits. The level of training for demolition activities will be sufficient such that the workers will know when to call their supervisors to investigate an object that may be a historical resource. Supervisors will receive sufficient training to determine when a cultural resources specialist should be contacted to identify any found objects. If cultural resources are encountered during demolition, the dam removal crew will halt work in the area and not collect or disturb the materials until the archaeological monitor(s), appointed under Measure G-2a, have evaluated the location and determined an appropriate mode of action.

G-3 The SFPUC will notify the ERO of unanticipated discoveries of paleontological resources. The SFPUC will retain the services of a qualified paleontologist per the Society of Vertebrate Paleontology standards (SVP, 1991), who will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in Section 15064.5 of the CEQA Guidelines. In the event of an unanticipated discovery of a fossil during dam removal activities, excavations within 50 feet of the find will be temporarily halted or diverted until the discovery is examined by a qualified paleontologist. The paleontologist will notify the ERO to determine procedures to be followed before demolition is allowed to resume at the location of the find. If the ERO determines that avoidance is not feasible, the paleontologist will prepare an excavation/data recovery plan for mitigating the effect of the project on the qualities that make the resource important, and such plan will be implemented. The plan will be submitted to the ERO for review and approval before implementing the excavation/data recovery plan.

Noise and Vibration

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified a BMP to avoid noise impacts. The measure is as follows:

> In general, work is conducted during normal working hours during weekdays. Internal combustion engines would be equipped with adequate mufflers. Excessive idling of vehicles would be prohibited.

Mitigation Measures Identified in this DEIR

The following measures are recommended to further reduce the less-than-significant noise impacts.

H-1 If controlled blasting occurs, the SFPUC will notify the residents in the town of Sunol in advance of these activities. Notification may include the delivery of flyers to residences describing the warning horn and blasting sounds and providing the dates and times blasting may occur; and the placement of signs in the town of Sunol and on SR 84 advising eastbound and westbound drivers of the controlled blasting activities. At a minimum, signs on SR 84 should be placed as close to the blasting activity as feasible, one-half mile on either side of each dam, and one mile on either side of each dam.

Cumulative Environmental Effects

The DEIR examines related projects that could, in combination with the proposed project, result in considerable cumulative environmental effects. Several projects are planned in the Alameda Creek watershed. Cumulative demolition-related impacts could occur if these other planned projects were to coincide with dam removal activities; and cumulative long-term impacts could occur if these planned projects affected overlapping environmental resources. The individual projects within the Alameda Creek watershed are subject to separate environmental review processes. A variety of mitigation measures have been included in the project description and recommended in this report to ensure that the proposed project would not contribute to any potentially significant cumulative impacts.

At the Niles Dam site, a California Department of Transportation (Caltrans) project could contribute to the cumulative loss of willow habitat and the incidental take of Alameda whipsnake. The SFPUC has initiated consultation and coordination with the USFWS to address potential habitat impacts. However, the proposed project would avoid contributing to the cumulative loss or degradation of suitable habitat for special-status species through mitigation measures identified in this DEIR.

The following measure is recommended to further reduce the cumulative effect on SR 84 traffic flow and safety to a less-than-significant level.

I-1 The SFPUC will provide project schedule information updates in order for Caltrans to arrange its project work schedule to minimize potential cumulative effects on SR 84.

D. Other CEQA-Required Topics

Growth Inducement

Implementation of the proposed project would not result in growth-inducing effects, either directly or indirectly. No new population growth would be accommodated, because the proposed

project would not increase the overall capacity of the SFPUC water system, nor expand the water system in the SFPUC service area. The project would not alter surrounding land use patterns or encourage increased development in the vicinity of the removed dams.

Significant, Unavoidable Environmental Effects

This DEIR evaluates potential environmental impacts for various aspects of project implementation at the project level, based on the conceptual design information available at this time. Potentially significant impacts associated with removal of the dams would be reduced to a less-than-significant level with implementation of mitigation measures that have been incorporated into the project description or recommended in this report, with the exception of impacts to historical resources, which would remain significant and unavoidable.

Significant, Irreversible Environmental Changes

Dam removal would result in an irretrievable and irreversible commitment of natural resources through the use of fossil fuels. Since the project would involve only minor incremental use of nonrenewable resources, it would not result in significant and irreversible environmental changes. In addition, Alameda Creek would be changed from one of impounded water behind the dams to a free-flowing creek within the areas of the dams. This change in hydrology would also affect groundwater levels and the habitats in the areas of the former impoundments.

Alternatives to the Proposed Project

The No Project alternative would avoid the impacts associated with the proposed project; however, this alternative would not meet Objectives #2 and #3. The Retain Dams, Install Fish Ladders and Safety Fencing alternative meets only Objective #3. With respect to Objective #2, as long as the dams remain in place, public safety is at risk and the City and County of San Francisco would be subject to risk management concerns. Safety fencing under this alternative would not eliminate the public safety concerns, as fences can be cut and access to the dam sites gained. Furthermore, Objective #1 might not be fully met, because fish ladders could present challenges for fish passage.

E. Areas of Controversy

In June 2004, the NMFS proposed to include resident *O. mykiss* found upstream of Rubber Dam 1 in Alameda Creek in the Central California Coast Evolutionary Significant Unit. This decision was based on genetic testing conducted by Nielson (2003) (as reported in NMFS, 2004) that suggested that resident *O. mykiss* found within the Alameda Creek watershed displayed similar genetic characteristics to migratory *O. mykiss*. The SFPUC has disputed Nielson's study methods and conclusions in their comments to the NMFS proposed rule. On June 28, 2005, the NMFS extended the deadline for the final ruling for an additional six months. Regardless of the final

decision by the NMFS, the impacts and mitigation measures identified in this DEIR would remain the same.

TABLE 1
COMPARATIVE SUMMARY OF ENVIRONMENTAL IMPACTS

Environmental Impact	Level of Significance[a]			
	Project	No Project Alternative	Sediment Removal Alternative[b]	Retain Dams, Install Fish Ladders with Safety Fencing
Compatibility with Local Plans and Policies				
Conflicts with established uses	LS	N/A	LS	LS
Transportation, Circulation, and Parking				
Vehicle trip generation	LS	N/A	PSM	LS
Traffic safety impacts from construction and operational traffic	PSM	N/A	PSM	LS
Utilities and Public Services				
Breach of published national, state, or local standards relating to solid waste or litter control	PSM	N/A	PSM	LS
Biological Resources				
Wetland impacts	PSM	N/A	PSM	LS
Special-status species impacts	PSM and B	N/A	PSM and B	PSM and B
Common species impacts	LS	N/A	LS	LS
Riparian habitat impacts	PSM	N/A	PSM	LS
Geology, Soils, and Seismicity				
Soil erosion	PSM	N/A	PSM	LS
Seismic hazards – ground rupture and shaking, liquefaction	LS	N/A	LS	LS
Loss of mineral resources	N/A	N/A	N/A	N/A

a SU = Significant Unavoidable Impact, Cannot be Mitigated
PSM = Potentially Significant Impact, Can Be Mitigated
SM = Significant Impact, Can Be Mitigated
B = Beneficial Impact
LS = Less than Significant Impact
N/A = Not Applicable

b From the conceptual engineering report.

TABLE 1 (Continued)
COMPARATIVE SUMMARY OF ENVIRONMENTAL IMPACTS

Environmental Impact	Level of Significance[a]			
	Project	No Project Alternative	Sediment Removal Alternative[b]	Retain Dams, Install Fish Ladders with Safety Fencing
Hydrology, Groundwater, and Water Quality				
Groundwater level impacts	PSM	N/A	PSM	LS
Construction impact to water quality	PSM	N/A	PSM	PSM
Impact to facilities from flooding	LS	N/A	LS	N/A
Historical Resources				
Construction impacts to archaeological resources	SU	N/A	SU	LS
Construction impacts to architectural resources	SU	N/A	SU	LS
Other Environmental Issues				
Growth-inducing impacts	N/A	N/A	N/A	N/A
Cumulative impacts	PSM	N/A	PSM	LS
Environmental impacts that cannot be avoided	SU	N/A	SU	LS
Irreversible environmental changes	SU and B	N/A	SU and B	LS

[a] SU = Significant Unavoidable Impact, Cannot be Mitigated
PSM = Potentially Significant Impact, Can Be Mitigated
SM = Significant Impact, Can Be Mitigated
B = Beneficial Impact
LS = Less than Significant Impact
N/A = Not Applicable

[b] From the conceptual engineering report.

CHAPTER II
Introduction

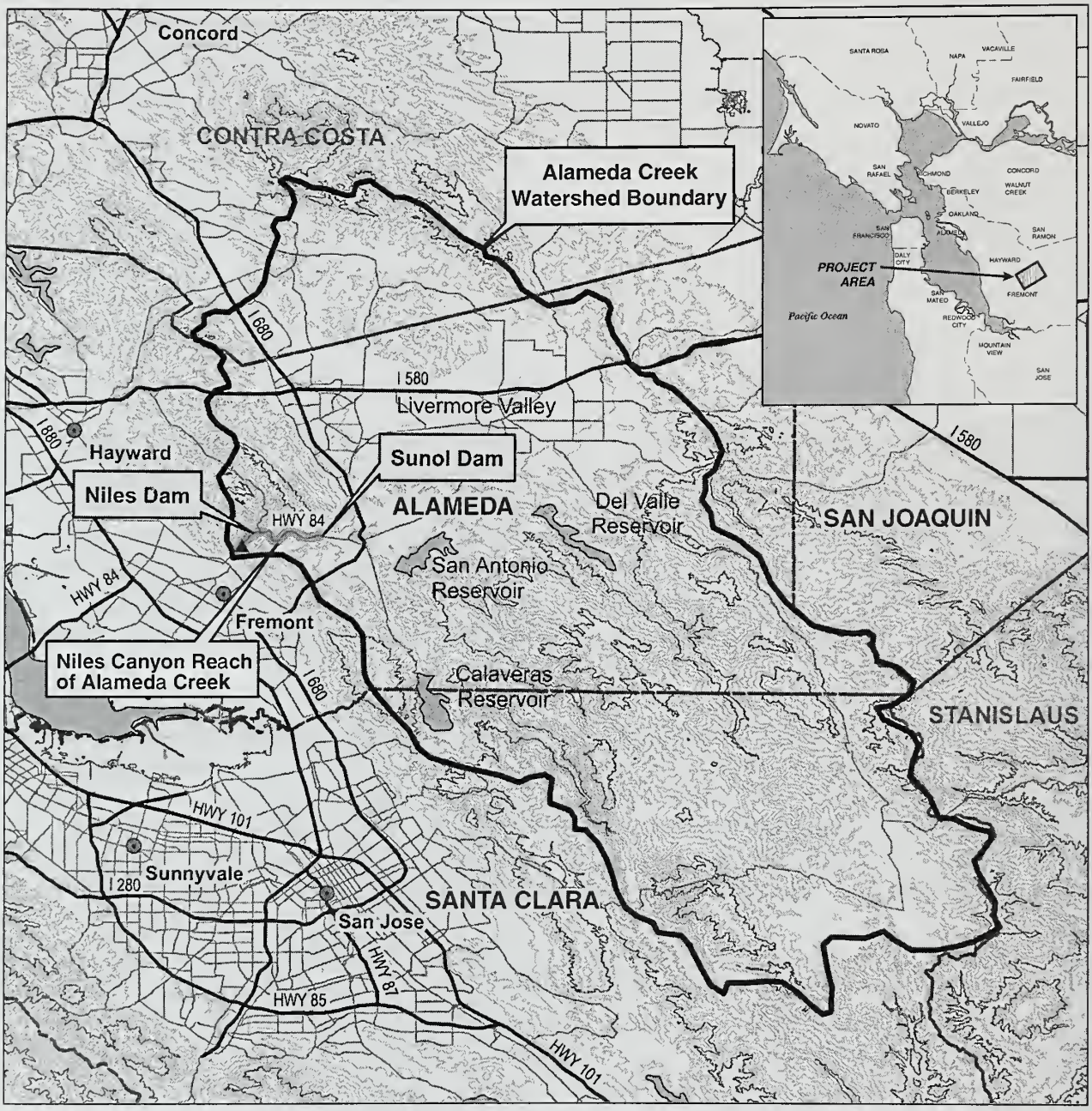
A. Introduction

The San Francisco Public Utilities Commission (SFPUC) is proposing to partially remove Sunol and Niles Dams, which are located in the Niles Canyon reach of Alameda Creek in Alameda County (see Figure 1). The dams would be removed to eliminate barriers to fish passage and to address public safety and risk management concerns. Following removal of the dams, impounded sediment would be left in place to move downstream naturally over a period of several decades. Removal of the dams is proposed to occur between May and November of 2006. Chapter III, Project Description, describes the Sunol and Niles Dam Removal Project (the "proposed project" or "project") in more detail.

Under the San Francisco Administrative Code, Chapter 31, the San Francisco Planning Department, Major Environmental Analysis (MEA) section is responsible for implementing the California Environmental Quality Act (CEQA) review of all City and County of San Francisco projects. MEA is the lead agency for this environmental impact report (EIR), and the project sponsor is the SFPUC. This document constitutes the Draft EIR (DEIR) on the proposed project and was prepared in accordance with CEQA to fulfill that requirement.

On July 9, 2004, MEA prepared and distributed an Initial Study on the project in accordance with the requirements of CEQA. The Initial Study concluded that this project could have a significant effect on the environment, and that preparation of an EIR was required. The Initial Study (along with the Notice of Preparation and distribution list) is included as Appendix A to this report. The Initial Study examined the potential effects of the proposed project on the environment and determined that some impacts would either be negligible or mitigable to a less-than-significant level through project design. The following impact areas were discussed in the Initial Study and, for that reason, are not examined further in this DEIR:

- Compatibility with Existing Zoning and Plans: variances, special authorizations, or changes to the San Francisco Planning Code or Zoning Map
- Land Use
- Visual Quality
- Population
- Air Quality/Climate



Contour interval is 100 m. Map projection is Geographic, NAD83. Map data from ESRI (2002); Tiger Census (2000); USGS.

County boundary

Major road

Minor road

City, population >100,000

USGS gauging station 11179000

Niles Canyon Reach of Alameda Creek

0 10

Miles

SOURCE: Geomatrix, 2004

Sunol-Niles / 201591 ■

Figure 1

Map of Alameda Creek Watershed and Location of Sunol and Niles Dams

- Utilities/Public Services: the extension of a sewer trunk line with capacity to serve new development; demand for schools, recreation, or other public facilities
- Geology/Topography: topography or unique geologic or physical features of the two project sites
- Water: contamination of a public water supply
- Energy/Natural Resources
- Hazards

The DEIR focuses on the impact areas identified as potentially significant in the Initial Study. These impact areas are:

- Compatibility with Existing Zoning and Plans: conflicts with adopted environmental plans and goals of the city or region
- Transportation/Circulation
- Utilities/Public Services: published national, state, or local standards relating to solid waste or litter control; and major expansion of power, water, or communications facilities
- Biology
- Geology/Topography: exposure of people or structures to major geologic hazards (slides, subsidence, erosion, or liquefaction)
- Water: degradation of water quality; degradation or depletion of groundwater resources; substantial interference with groundwater recharge; and flooding, erosion, or siltation
- Historical Resources
- Noise and Vibration

B. Purpose of the EIR

This DEIR is a public informational document for use by responsible government agencies and the public to identify and evaluate the potential physical environmental impacts associated with the proposed project, to identify mitigation measures to reduce or avoid potentially significant environmental impacts, and to examine and compare feasible alternatives to the proposed project.

The DEIR describes the project and the existing environmental setting; identifies potential physical environmental impacts, mitigation measures for impacts found to be significant, significant environmental effects the project cannot avoid, and significant irreversible environmental changes; and compares and evaluates project alternatives. Significance criteria were developed for each environmental issue analyzed in this DEIR and are defined at the beginning of each impact analysis section.

This DEIR will undergo a 45-day public review period, including one public hearing in San Francisco on December 1, 2005 and one in Fremont on November 30, 2005, to solicit comments from the public and agencies on the DEIR. The public comment period is from October 24, 2005 to December 7, 2005. During the public review period, comments on the accuracy and completeness of the information presented herein will be accepted. Following the public review period, responses to written and oral comments received from the public and agencies will be prepared. The DEIR will be revised accordingly, and a Final EIR will be distributed to all commenters and to individuals requesting a copy. The San Francisco Planning Commission will then consider certification of the Final EIR under CEQA, including consideration of whether the EIR is accurate, objective, and complete. Once certified, the EIR serves as one source of information to assist the SFPUC in determining whether to approve or modify the proposed project.

C. Overview of the SFPUC Water Supply System and Service Area

The SFPUC's water system is located in central California and encompasses watersheds in the San Francisco Bay Area and the Sierra Nevada mountains. The SFPUC's service area includes 2.4 million customers in San Francisco and in portions of San Mateo, Santa Clara, and Alameda Counties. The SFPUC water system obtains water from three sources:

- Tuolumne River via the Hetch Hetchy Water and Power system in the Sierra Nevada mountains
- Local runoff in the Calaveras Reservoir and San Antonio Reservoir watersheds within the greater Alameda Creek watershed
- Local runoff in the Crystal Springs, San Andreas, and Pilarcitos Reservoir watersheds within the greater Peninsula watershed

Approximately 85 percent of the potable (drinking) water supply to SFPUC customers is provided by the Hetch Hetchy watershed. Runoff from the Peninsula and Alameda Creek watersheds contributes approximately 15 percent of the water supply.

The greater Bay Area portion of the system includes five primary reservoirs on the Peninsula and Alameda Creek watersheds and the 59,000 acres of watershed lands in Alameda, Santa Clara, and San Mateo Counties. Water from these local water sources is blended with Hetch Hetchy water. A portion of the water delivered from the Hetch Hetchy Water and Power system can be stored in the San Antonio Reservoir within the Alameda Creek watershed. This water may be combined with local runoff collected in Calaveras Reservoir and San Antonio Reservoir and treated at the Sunol Water Treatment Plant. It is then distributed to wholesale customers on its way through Alameda County, across the San Francisco Bay, and up the Peninsula to San Francisco. Another portion of Hetch Hetchy water may be stored in Peninsula reservoirs where it can be blended with Peninsula watershed runoff and treated at the Harry W. Tracy Water Treatment Plant.

Sunol and Niles Dams were once part of the SFPUC's water system within the Alameda Creek watershed; however, the dams are no longer in service. Currently, the dams represent barriers to the potential upstream migration of central California coast steelhead (*Onchorynchus mykiss*), a federally listed threatened species. In addition, the pools created by the dams attract trespassers, which pose a risk management concern for the City and County of San Francisco.

D. Background

In 1900, the Spring Valley Water Company (the predecessor to the SFPUC) built Sunol Dam, a gravity concrete dam, to provide water to San Francisco. The Spring Valley Water Company constructed Sunol Dam, in part, to "hold back" groundwater in the upstream gravel deposits occupying Sunol Valley. Around the same time, the water company built the Sunol infiltration galleries upstream to drain the water from the gravels into Sunol Aqueduct. A 3-foot-by-3-foot aqueduct connects a bypass structure on the east embankment to the Sunol Aqueduct at the west embankment. Spring Valley also constructed a fish ladder as part of Sunol Dam. This fish ladder is currently nonfunctioning. The height of the dam (foundation to crest) is 28.4 feet, and its length is 135 feet.

The Sunol infiltration galleries are buried in the aquifer and are essentially reinforced-concrete tunnels with perforated sides to collect water flowing through the gravel beds. The infiltration galleries were built at the base of the shallow, permeable alluvium on top of the older, cemented Livermore Gravel foundation. The infiltration galleries are in a state of disrepair, but the SFPUC, which now owns the dam, galleries, and water temple, still pumps water from the galleries to San Antonio Reservoir via the Sunol Pump Station adjacent to the temple.

The Spring Valley Water Company reportedly constructed Niles Dam in 1887 atop a stone dam. This stone dam was built in 1841 by Jose de Jesus Vallejo, the brother of General Vallejo, who constructed the original Niles Dam to provide water for a flour mill. The original stone dam was probably founded on bedrock; however, there are no data available to confirm this supposition. The main portion of the dam has a difference in elevation from the top of the main crest to the top of the foundation of about 1.7 feet. Niles Dam consists of flat blocks of rock placed on top of each other, with about a foot of concrete-slab topping. There are four parts to the dam:

- Right abutment (width = 10.5 feet and length = 25.8 feet)
- Fish ladder (nonfunctioning)
- Crest (length = 60 feet)
- Left abutment (width = 6 feet and length = 42 feet)

Portions of the Alameda Creek watershed, comprising about 633 square miles, once supported viable runs of anadromous fish. According to research conducted by the Alameda Creek Fisheries Restoration Workgroup, in which the SFPUC participates, steelhead are currently prevented from reaching the middle and upper reaches of Alameda Creek because of the presence of downstream migration barriers. In the area where Alameda Creek is a flood control channel (see "Alameda

Flood Control Channel" in Figure 2), there are four barriers to upstream migration of adult steelhead. The four barriers, owners, and approximate locations are:

- Lower inflatable dam, Alameda County Water District, quarry ponds
- BART weir, Alameda County Flood Control District, quarry ponds/BART crossing
- Middle inflatable dam, Alameda County Water District, quarry ponds
- Upper inflatable dam, Alameda County Water District, quarry ponds

The SFPUC proposes to partially remove Sunol and Niles Dams before the downstream barriers to upstream migration are bypassed. In addition, the two dams (particularly Sunol Dam) create pools that attract some members of the public, despite No Trespassing signage and efforts to exclude trespassers (e.g., locked gates and fences). The SFPUC is proposing to partially remove Sunol and Niles Dams because of these two issues. The dams are no longer in use by the SFPUC for water diversion or supply.

E. Public Outreach

The SFPUC presented the proposed project to resource agencies at an Interagency Coordination Meeting[1] on October 8, 2003 to solicit agency concerns in connection with preparation of the Preconstruction Notification and Draft Biological Assessment for the project. Prior to the Interagency Coordination Meeting, the National Marine Fisheries Service (NMFS) had an opportunity to comment on the draft conceptual engineering report for the removal of Sunol and Niles Dams.[2] The NMFS raised concerns about the final dam/channel configurations and the necessity of sediment removal (NMFS, 2004).[3] Because of these concerns, the SFPUC contracted with Weiss Associates to prepare a channel geomorphology report (see Appendix B). In addition to the Interagency Coordination Meeting, several meetings with resource and permitting agencies (i.e., the NMFS and California Department of Fish and Game) were held to discuss the channel geomorphology study. The dates of the meetings were: July 22, 2004; August 19, 2004; and September 30, 2004. Based on the concerns raised by the NMFS and the results of the channel geomorphology study, the SFPUC revised the Sunol and Niles Dam Removal Project. The revised project is presented in Chapter III, Project Description.

On July 9, 2004, MEA published an Initial Study (see Appendix A) on the project. The 30-day public review period ended on August 8, 2004. Three comment letters were received in response to the Initial Study: San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), California Department of Transportation (Caltrans), and a citizen (see Appendix C). The SFBRWQCB had an informational comment on total petroleum hydrocarbons as diesel, and

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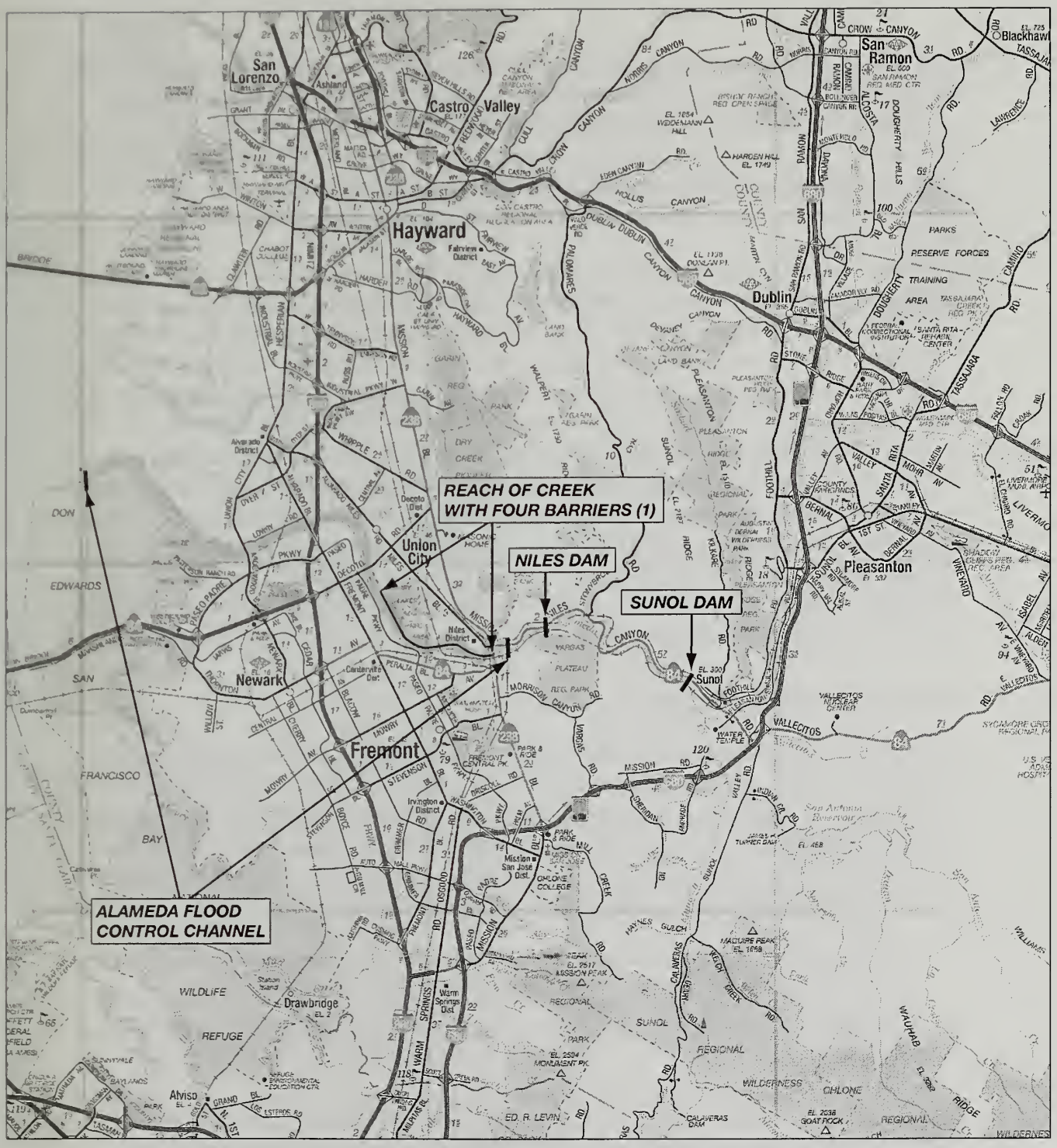
1 An Interagency Coordination Meeting is a monthly meeting conducted by the U.S. Army Corps of Engineers for potential applicants to present projects to various state and federal resource and permitting agencies.

2 The NMFS was not represented at the Interagency Coordination Meeting.

3 In a March 16, 2004 letter to the SFPUC, the NMFS states that it "... strongly supports SFPUC's proposal to remove Sunol and Niles Dams ... [as] removal of these dams will greatly benefit efforts to restore an anadromous run of steelhead to the watershed."



(1) Lower inflatable dam, Alameda County Water District, quarry ponds
BART weir, Alameda County Flood Control District, quarry ponds/BART crossing
Middle inflatable dam, Alameda County Water District, quarry ponds
Upper inflatable dam, Alameda County Water District, quarry ponds

SOURCE: Environmental Science Associates, 2005; CSAA base map

Sunol-Niles / 201591 ■

Figure 2
Project Location, Project Sites, and Location of Anadromous Fish In-Migration Barriers

another comment on the use of straw bales as filtering devices. The SFBRWQCB recommended the use of filter rolls, fiber coirs, or other effective devices rather than straw bales.[4] Caltrans noted that an encroachment permit would be required if work encroaches into the state right-of-way, and that traffic-related mitigation measures would be incorporated into construction plans during the encroachment permit process.[5] The citizen expressed his support for removing the dams. However, he was also concerned about saving a patch of sedge used in Native American basketry.[6]

During the public review period for the Initial Study, a public scoping meeting was held (on July 28, 2004) at the Fremont Public Library in Fremont, California. In this meeting, MEA staff presented the project and solicited preliminary comments from the public. The following were the issues brought up at the public scoping meeting: historic nature of the dams and whether the Niles Dam could be removed and rebuilt at the Vallejo Mill site[7]; aesthetics (with respect to partial removal of Sunol Dam and leaving a concrete face)[8]; potential for radioactive material in the sediment behind the dams[9]; the need to consider steelhead to be present and special studies to be undertaken[10]; traffic and staging of work at Niles Dam[11]; and watershed planning (with respect to the downstream barriers and dams farther upstream and the restoration of steelhead).[12]

The SFPUC presented the preliminary draft conceptual engineering report to the Alameda Creek Fisheries Restoration Workgroup on July 23, 2003.

F. Proposed Project

The project analyzed in this DEIR is described in the conceptual engineering report prepared by Geomatrix Consultants (2004), as modified by Weiss Associates (2004). The proposed project is presented at a conceptual level of detail. The project description presented in this document varies from that published in the Initial Study (see Appendix A) because of new information presented in the Weiss Associates channel geomorphology study. The significant differences between the project as described in the Initial Study and this DEIR are as follows:

- The project no longer proposes to remove all of the sediment from behind Sunol and Niles Dams, except for the amount necessary to perform demolition activities.
- Sunol Dam would no longer contain a low-flow notch. The final crest of the dam would be flat all the way across.

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4 See Chapter V, Mitigation Measures (Mitigation Measure F-1b).

5 See Chapter V, Mitigation Measures (Transportation, Circulation, and Parking).

6 See Section IV.G, Historical Resources (Native American Consultation).

7 See Section IV.G, Historical Resources, for a discussion of the historical significance of Niles Dam. See Chapter V, Mitigation Measures (Mitigation Measures G-1a and G-1b).

8 See Appendix A, page 22, for a discussion of aesthetics.

9 See Section IV.F, Hydrology, Groundwater, and Water Quality (Sediment Quality).

10 See Section IV.D, Biological Resources, for a discussion of steelhead and special studies.

11 See Chapter III, Project Description (Niles Dam).

12 See Section IV.I, Cumulative Environmental Effects.

- An adverse slope across the Sunol Dam width, from downstream to upstream, would be cut across the top of the dam to alter it from a broad-crested weir to a sharp-crested weir.[13] This alteration would reduce the risk of the dam acting as a fish barrier, should the dam crest become exposed.

- An additional 66 feet of the left abutment[14] of Niles Dam would be removed, as would a greater portion of the right abutment, as geotechnically feasible.

The impact areas eliminated from consideration in the Initial Study have not changed because of these project modifications. Chapter III, Project Description, Section D, describes the proposed project in greater detail.

G. Organization of the EIR

Chapter III of this DEIR describes the project, project objectives, and the approvals and permits required to implement the proposed project. Chapter IV presents the existing environmental setting for Sunol and Niles Dams and an analysis of the potential environmental impacts. Chapter V describes the mitigation measures that would reduce the potentially significant impacts of the project. Chapter VI presents the significant environmental impacts that cannot be avoided. Chapter VII describes the significant irreversible environmental changes due to the proposed project. Chapter VIII presents a comparison of feasible alternatives to the project.

References

City and County of San Francisco, Planning Department, *Sunol/Niles Dam Removal Initial Study/Notice of Preparation* (see Appendix A), 2004.

Geomatrix Consultants, *Final Report Conceptual Engineering for Removal of Sunol and Niles Dams, Alameda County, California*, prepared for the San Francisco Public Utilities Commission, 2004.

National Marine Fisheries Service (NMFS), letter from Rodney R. McInnis, Acting Regional Director, to Harlan Kelly, Jr., San Francisco Public Utilities Commission. March 16, 2004 #151422SWR04SR6245:GRS, 2004.

Weiss Associates, *Final Report for Channel Geomorphology Study Niles and Sunol Dam Removal Project, Alameda County, California* (see Appendix B), 2004.

[13] A "broad-crested" weir has a flat top (see Figure 6 in Chapter III, Project Description), while a "sharp-crested" weir has an angled top (see Figure 7, cross-section A-A' in Chapter III, Project Description).

[14] References to left and right are from the viewer's point of view when looking downstream.

CHAPTER III
Project Description

A. Project Location

Sunol Dam is located in the Niles Canyon reach of Alameda Creek at river mile 16.2 (see Figures 1 and 2 in Chapter II). State Route (SR) 84 (Niles Canyon Road) parallels the creek through Niles Canyon and lies to the north of the dam. Niles Dam is located on Alameda Creek at river mile 12.8, near the downstream end of Niles Canyon. SR 84 lies directly adjacent to the Niles Dam site.

B. Project Objectives

There are three primary and equal project objectives:

1. Remove barriers to fish passage in keeping with the Alameda Creek Fisheries Restoration Workgroup goal of restoring a self-sustaining population of steelhead to the Alameda Creek watershed, while recognizing other beneficial uses (e.g., water supply and flood control).

2. Reduce or eliminate an existing public safety hazard and related San Francisco Public Utilities Commission (SFPUC) risk management concerns.

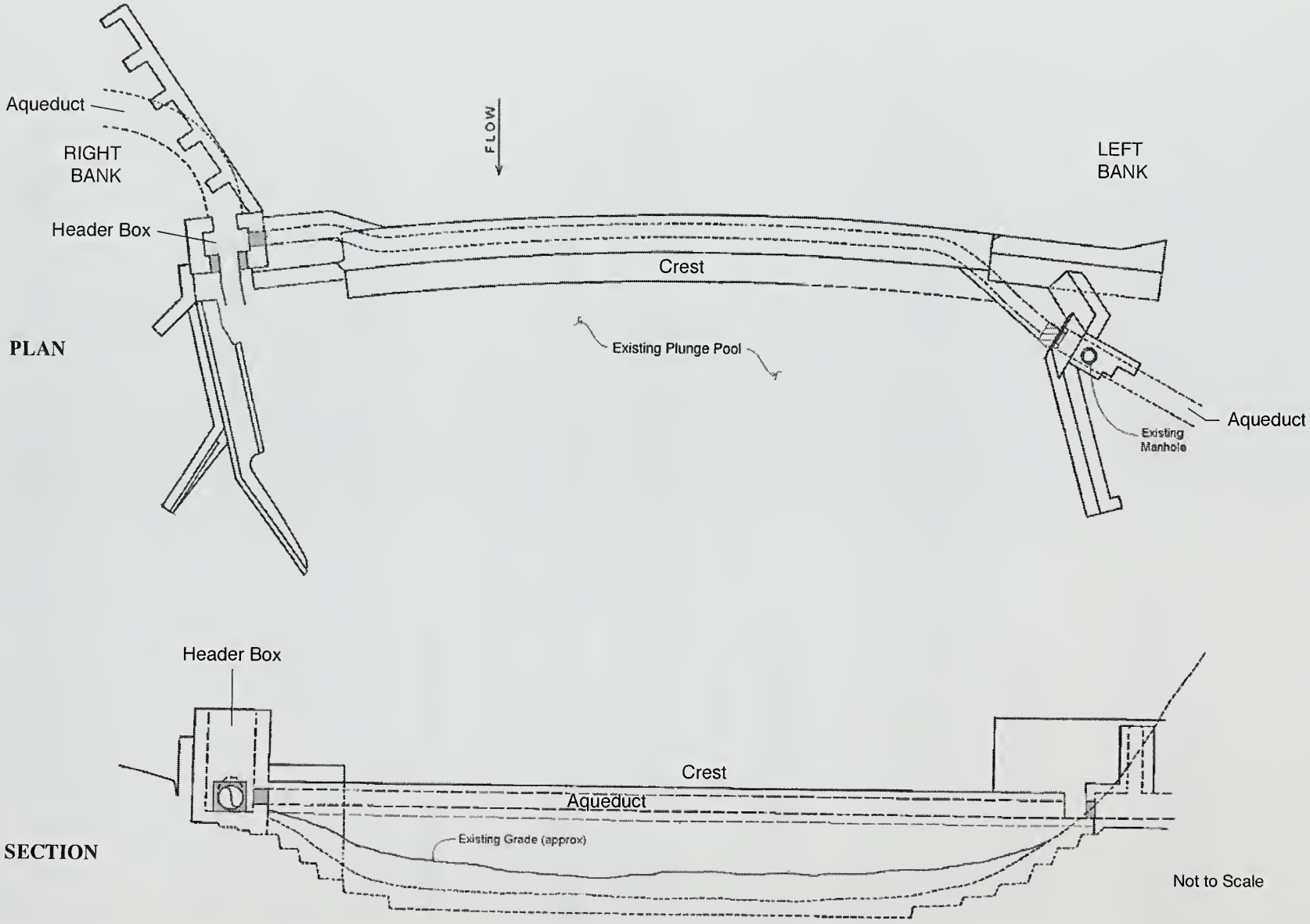
3. Perform dam removal in an environmentally sensitive manner.

C. Proposed Project

This section describes the proposed project, which includes the partial removal of Sunol and Niles Dams. Figure 3 shows a plan view[1] and a section view[2] of Sunol Dam, while Figure 4 shows a plan view and section view of Niles Dam. The differences between the project described in this section and the one evaluated in the Initial Study are as follows:

- The project no longer includes removal of all of the sediment from behind Sunol and Niles Dams.

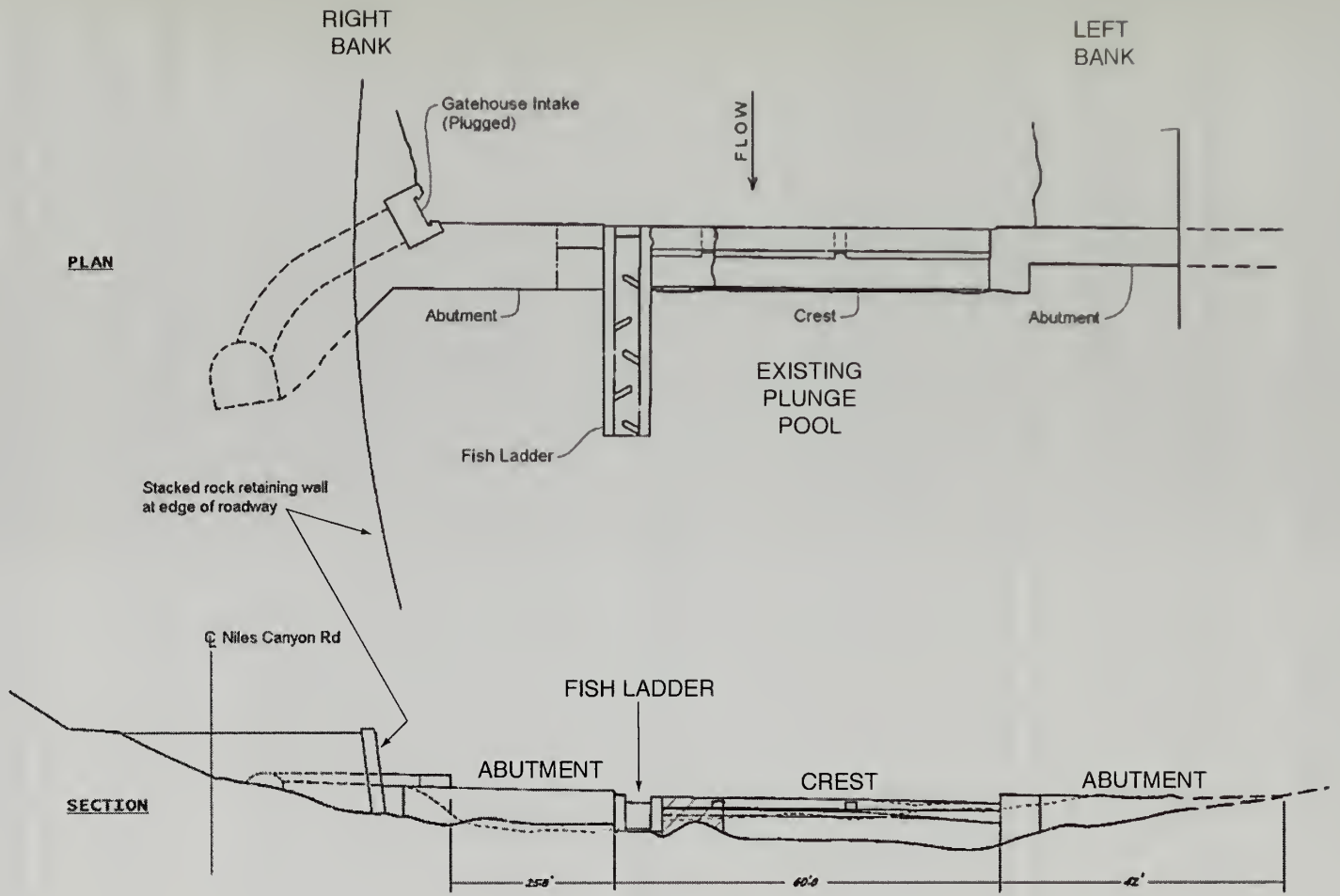
[1] A "plan view" is a birds-eye view that shows what the dam looks like when viewed from above the dam.
[2] A "section view" shows how the dam looks as though facing the dam from the downstream side looking upstream. Visible features are shown with a solid line, while features that are not visible are shown with a dashed line to indicate that they are within the dam (e.g., the aqueduct in Sunol Dam).



SOURCE: HDR Engineering, 2004

Sunol-Niles / 201591 ■

Figure 3
Sunol Dam-
Plan and Cross-Section



SOURCE: HDR Engineering, 2004

Sunol-Niles / 201591 ■

Figure 4
Niles Dam-
Plan and Cross-Section

- Sunol Dam would no longer contain a low-flow notch. The final crest of the dam would be flat all the way across.
- An adverse slope across the Sunol Dam width, from downstream to upstream, would be cut across the top of the dam to alter it from a broad-crested weir to a sharp-crested weir.[3] This alteration would reduce the risk of the dam acting as a fish barrier, should the dam crest become exposed.
- An additional 66 feet of the left abutment[4] of Niles Dam would be removed as well as a greater portion of the right abutment, as geotechnically feasible.

As noted in the Initial Study (see Appendix A), several best management practices (BMPs) have been incorporated into the project and would be included in the mitigation monitoring plan to ensure their implementation. BMPs are standard methods, measures, or practices such as structural and nonstructural controls or operation and maintenance procedures. BMPs should be viewed as a menu of options from which the SFPUC may select to address a particular set of problems. In addition, other BMPs may be employed by the SFPUC to address site-specific demolition effects; therefore, not all of the possible BMPs are listed either in the Initial Study or this DEIR.[5] In addition, an adaptive management approach would be instituted after removal of the dams to monitor the mitigation measures and to ensure that Objectives 1 and 2 are met.

Sunol Dam

Diversion/Dewatering of Alameda Creek

Before removing the dam and during dam-removal activities, flows from Alameda Creek would be diverted around the project area and discharged below the work area. Three options for the creek diversion are being considered. The first option consists of installing a small cutoff dam at the upstream end of the proposed work area and installing a steel pipeline with flexible mechanical couplings below the dam. Construction of the upstream gravel cutoff dam would be performed using an excavator and/or bulldozer. If sheetpiles were to be used, they would be installed using an excavator fitted with a vibratory driving attachment. An excavator or bulldozer would be used to construct a work platform or deck above the water to keep heavy equipment out of the active channel. The work platform would be constructed of gravels and/or heavy timber. Construction of the diversion channel would be performed using a backhoe and/or small bulldozer.

Modifications to the header box and upstream concrete structure would require an air-compressor for a portable pneumatic hammer.[6] The diversion pipe would be installed with an excavator,

[3] A "broad-crested" weir has a flat top (see Figure 6 in Chapter III, Project Description), while a "sharp-crested" weir has an angled top (see Figure 7, cross-section A-A' in Chapter III, Project Description).

[4] References to left and right are from the viewer's point of view when looking downstream.

[5] Additional BMPs may be found in the *Stormwater Best Management Practices Construction Handbook* (California Storm Water Quality Association, 2003) and *Caltrans Storm Water Quality Handbooks, Construction Site Best Management Practices and Planning and Design Staff Guide* (Caltrans, 2000), among others.

[6] A pneumatic hammer is a hammer driven by compressed air.

which would set the pipes, couplings, and fittings in place. The pipeline might need to be moved as work progresses.

The second option would modify the existing Sunol Aqueduct to divert creek flows around the project site (see Figure 5). Modifications to the Sunol Aqueduct would consist of the following:

- Downstream Modifications. A temporary diversion pipe and plug would be installed at the header box to plug the opening that leads across the crest of the dam (see Figure 6). A 200-foot diversion pipe would carry creek flows downstream of the worksite. A portion of the diversion pipe would be buried with native gravels and cobbles to form a berm that would act as a stream cutoff, provide equipment access to the left side of Alameda Creek, and create a downstream settling basin.

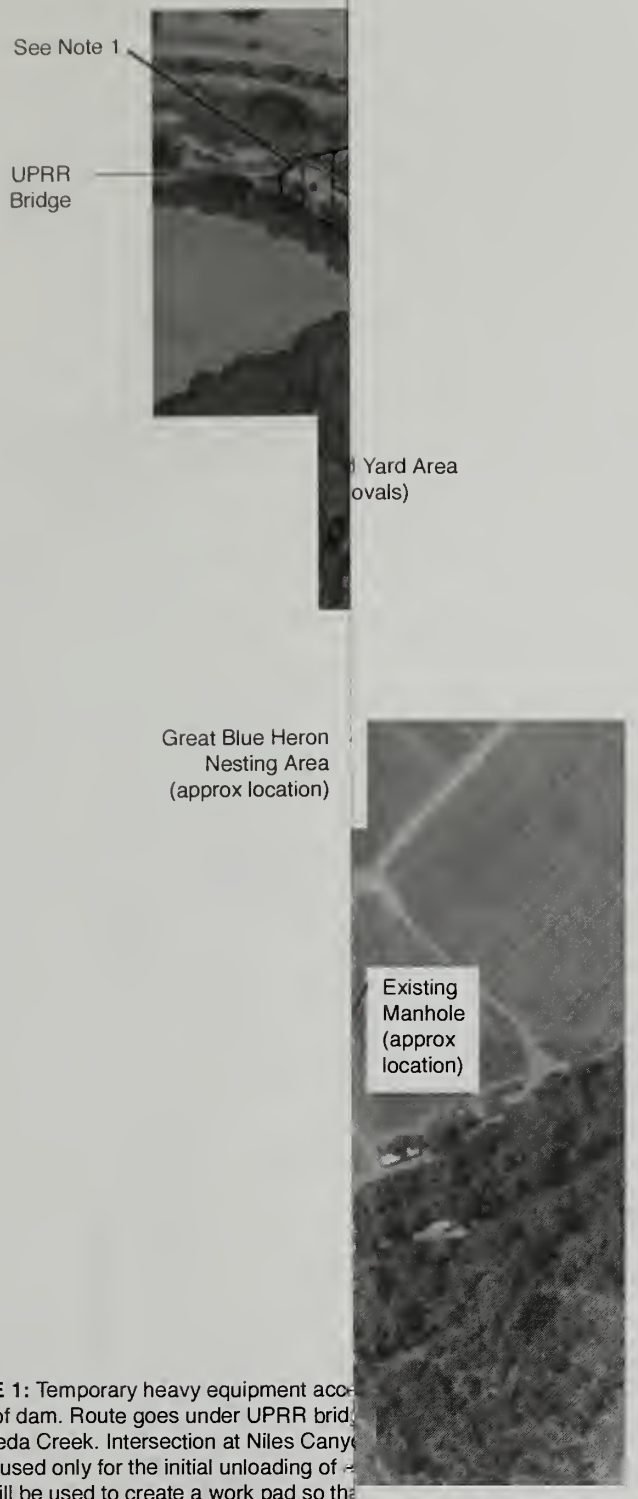
- Upstream Modifications. A modified intake would divert creek flows. A diversion pipe with a slide gate or other provision to control flows would be installed to divert flows into the aqueduct. Pumps would be used to bring water to the height of the intake structure. A generator (electric, gasoline, or diesel) would supply power to the pump. A temporary cutoff dam to prevent flows from continuing down the creek channel would be installed. The cutoff dam would be constructed from native gravels and cobbles or by installing continuous, interlocking sheetpiles. The cutoff dam would be high enough such that creek flows would naturally flow into the modified aqueduct intake structure if pumps were not used. In either case, native gravel and cobbles would be placed in the plunge pool (which would act as a detention basin) to form a low-height dam with a small, gated dewatering pipe (see Figure 6). The dewatering pipe would prevent any turbid water produced at the worksite from entering Alameda Creek. It would also prevent any accidental fuel or oil spill from entering Alameda Creek. Oil-absorbent materials would be placed around the diversion pipe to further filter debris and prevent unwanted fines or contaminants from entering Alameda Creek.

The third option would consist of isolating one-half of Sunol Dam at a time, using a cofferdam to divert the creek around the demolition area (see Figure 6a). Installation of the cofferdam would be the first step. One end of the cofferdam would abut the left bank, and the other end would be at the midpoint on Sunol Dam. The next step would be to construct a gravel berm downstream of the dam, with two approximately 24-inch-diameter pipes through the berm to allow the creek to flow. The berm would allow access from the right bank to the left bank of the creek and dam. Step three consists of installing a cofferdam on the downstream face of the dam to completely isolate one-half of the dam for demolition. Pumps would dewater the isolated area for demolition activities and to address any groundwater infiltration. Water would be pumped into plastic-lined settling basins and discharged into the creek. This dam isolation procedure would then be repeated on the other half of Sunol Dam.

Dam Removal

A portion of the dam structure would be removed down to an elevation of approximately 194.4 feet[7] (from an elevation of approximately 220 feet), which is the calculated historic bed elevation (Weiss Associates, 2004). In addition, the top of the dam would be altered to create a

[7] Final dam elevations (for both Sunol and Niles Dam) are ±3 inches.



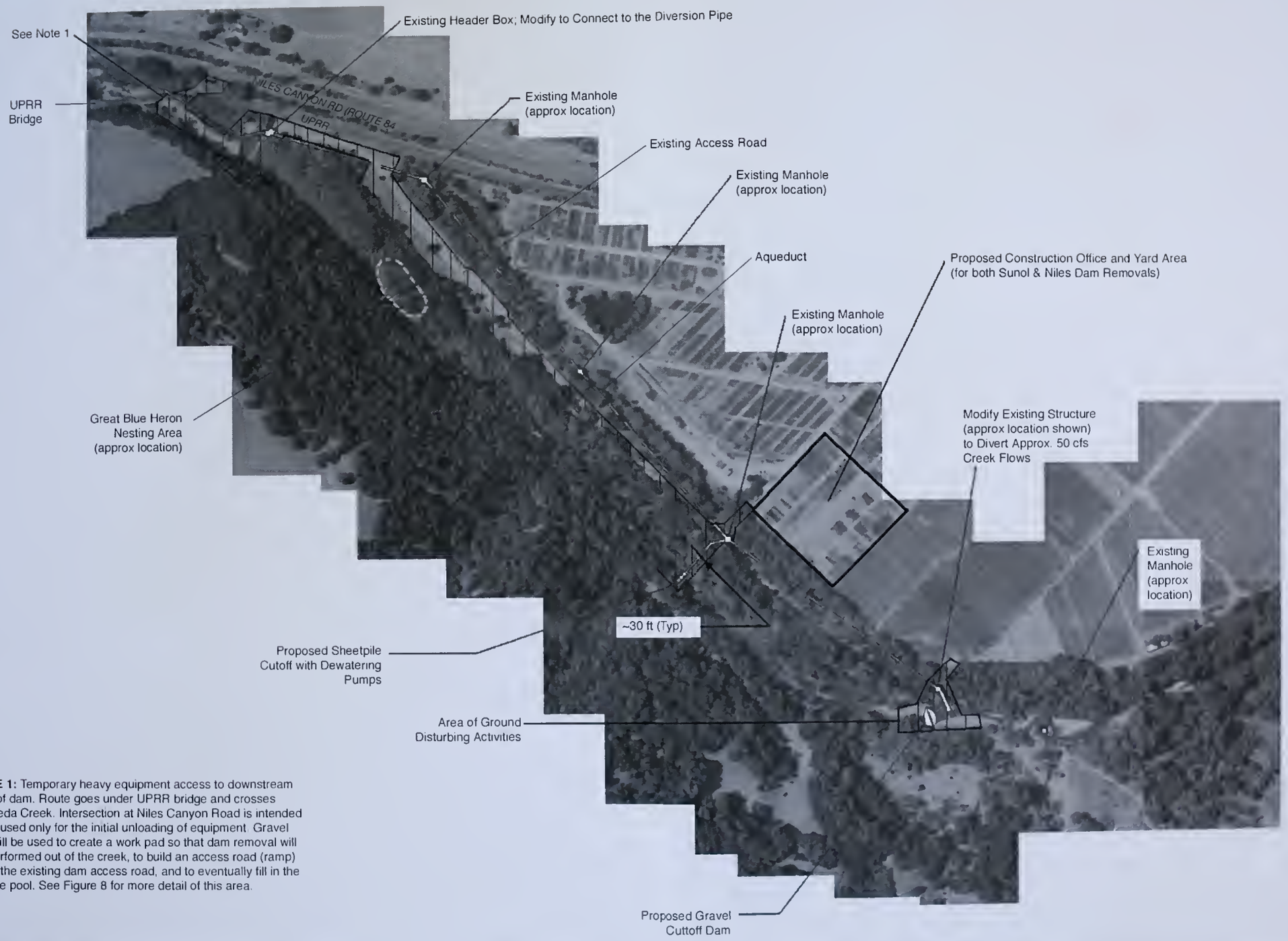
NOTE 1: Temporary heavy equipment acc
face of dam. Route goes under UPRR brid
Alameda Creek. Intersection at Niles Cany
to be used only for the initial unloading of
bar will be used to create a work pad so th
be performed out of the creek, to build an
up to the existing dam access road, and to
plunge pool. See Figure 8 for more detail o

SOURCE: HDR Engineering, 2004

Sunol-Niles / 201591 ■

Figure 5

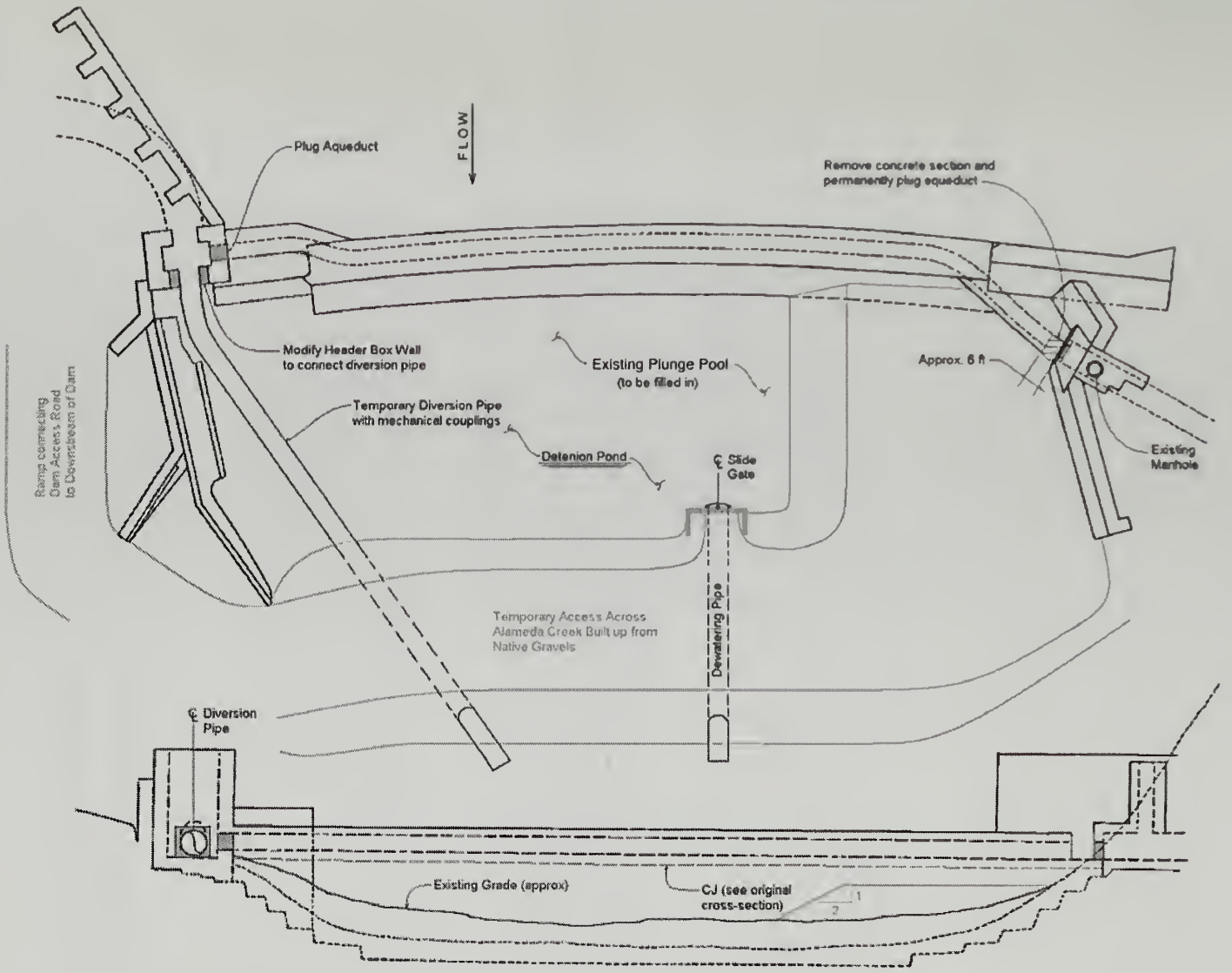
Sunol Dam-
d Diversion Plan, Access and Construction Office


See Note 1
Existing Header Box; Modify to Connect to the Diversion Pipe
UPRR Bridge
NILES CANYON RD (ROUTE 84
UPRR
Existing Manhole (approx location)
Existing Access Road
Existing Manhole (approx location)
Aqueduct
Proposed Construction Office and Yard Area (for both Sunol & Niles Dam Removals)
Existing Manhole (approx location)
Great Blue Heron Nesting Area (approx location)
Modify Existing Structure (approx location shown) to Divert Approx. 50 cfs Creek Flows
Existing Manhole (approx location)
~30 ft (Typ)
Proposed Sheetpile Cutoff with Dewatering Pumps
Area of Ground Disturbing Activities
Proposed Gravel Cuttoff Dam

NOTE 1: Temporary heavy equipment access to downstream face of dam. Route goes under UPRR bridge and crosses Alameda Creek. Intersection at Niles Canyon Road is intended to be used only for the initial unloading of equipment. Gravel bar will be used to create a work pad so that dam removal will be performed out of the creek, to build an access road (ramp) up to the existing dam access road, and to eventually fill in the plunge pool. See Figure 8 for more detail of this area.

SOURCE: HDR Engineering, 2004

Figure 5
Sunol Dam-
Proposed Diversion Plan, Access and Construction Office

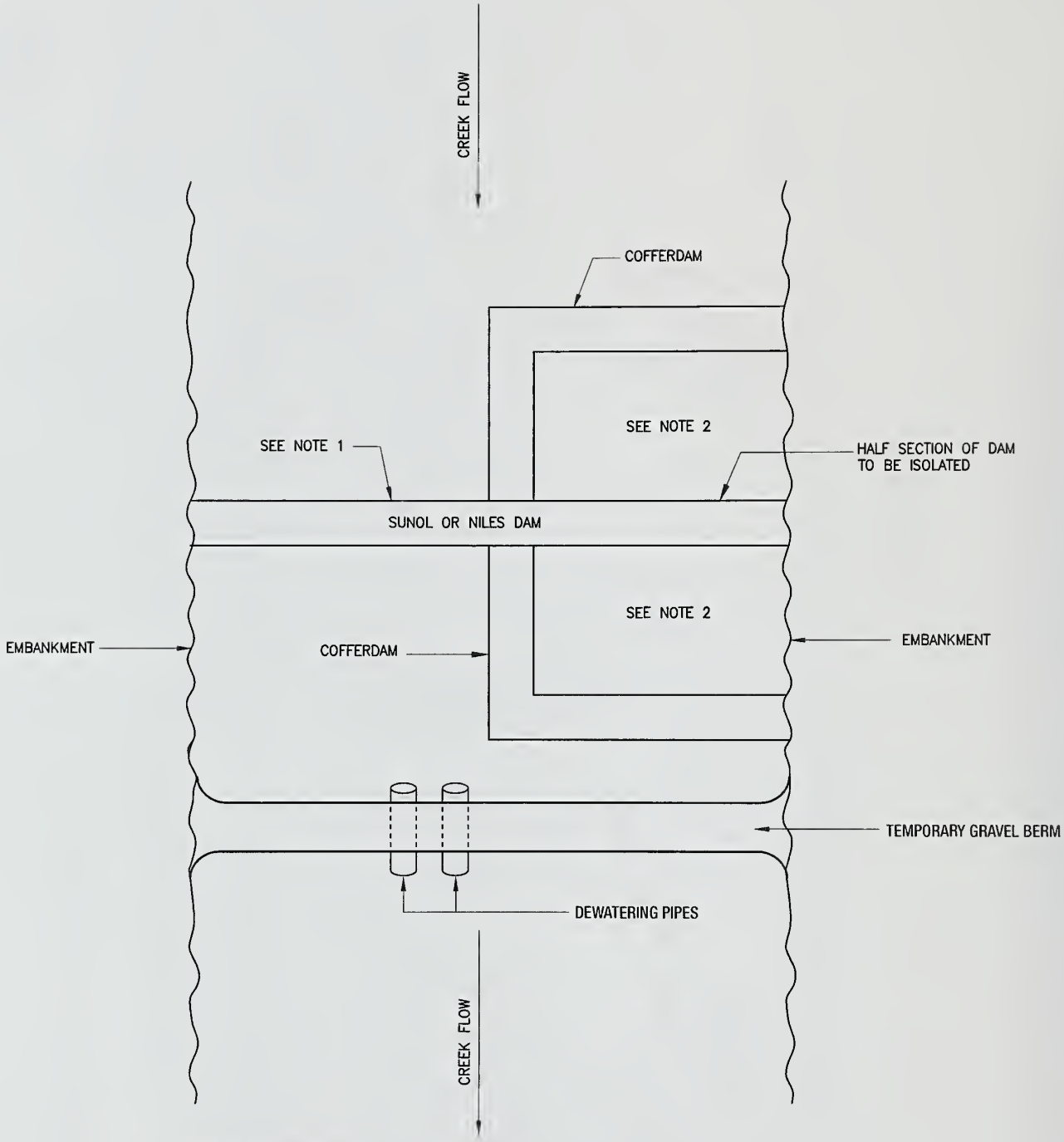


MODIFY HEADER BOX TO DIVERT CREEK FLOWS THROUGH EXISTING AQUEDUCT

SOURCE: HDR Engineering, 2004

Sunol-Niles / 201591 ■

Figure 6
Sunol Dam -
Removal Step 1



PLAN (Schematic)

NOTES:

1. ISOLATE REMAINING DAM SECTION FOR CONCRETE REMOVAL AFTER THE OTHER HALF IS REMOVED
2. PUMP WATER FROM ISOLATED AREA PRIOR TO DAM REMOVAL.

SOURCE: SFPUC, 2005

Sunol-Niles / 201591 ■

Figure 6a
Conceptual Dewatering Option Design

sharp-crested weir by cutting an adverse slope across the dam width, from downstream to upstream (see Figure 7). Should the dam crest become exposed over time, this alteration would reduce the risk of it acting as a fish barrier.

The left wing-wall would be removed down to the dam's crest. Portions of the left abutment would be removed such that the structure would not provide access to the area nor destabilize the slope (see Figure 7). The existing aqueduct and manhole on the left abutment would be permanently plugged to prevent flows from entering downstream segments of the aqueduct. An excavator with a hydraulic hammer attachment would be used to break open this section of the aqueduct to allow placement of the concrete plug. On the right side, portions of the header box and right wing-walls would be removed and a steel grate or flap gate installed on the aqueduct to prevent trespassing (see Figure 7). The plunge pool immediately downstream of the dam structure would be filled in with sediment (between 2,000 and 10,000 cubic yards [cy]) obtained from behind the dam after the dam has been removed.

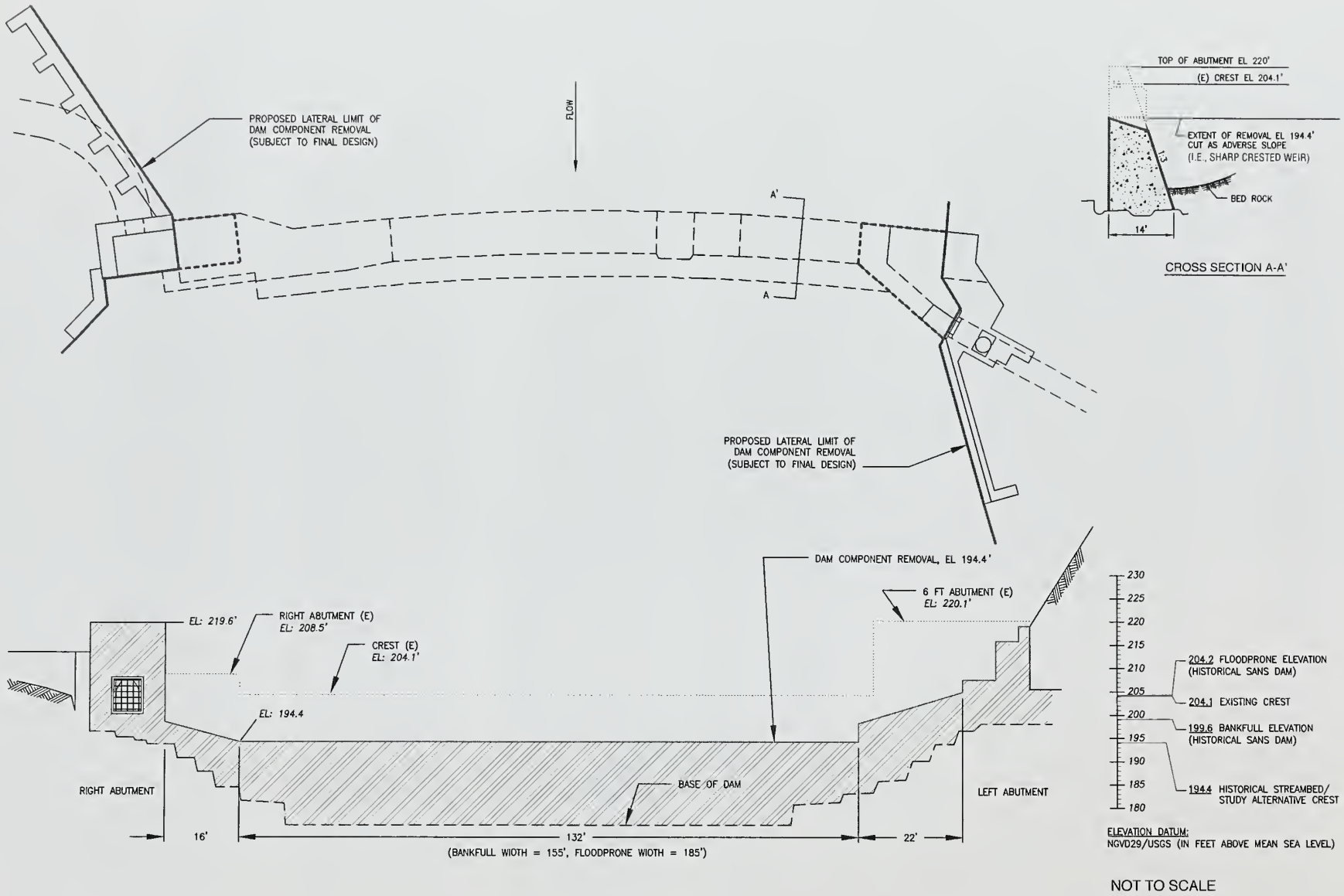
Removal Methods

The demolition of Sunol Dam would be accomplished using one or more of the following methods. An excavator with a hydraulic hammer attached would be used to "jackhammer" the concrete. Heavy equipment access to the face of the dam would be required to remove the structure down to an elevation of approximately 194.4 feet (see Access and Roads, below). An excavator with a bulldozer would be used to construct the access route.

A second demolition option is the use of controlled blasting in conjunction with the excavator. Controlled blasting to fracture the dam face would occur in a sequence in which 3-foot layers of the dam would be targeted. Following a controlled blast, the excavator would remove the material, and then the next 3-foot layer would be prepared for controlled blasting and removal. Up to eight blasts might be necessary, conducted on up to eight different days. The actual controlled blast would last for a couple of seconds.

Sunol Dam would be prepared for controlled blasting by drilling approximately 1.5-inch-diameter holes into the dam in a particular pattern to be determined by the blasting specialist. The holes would be filled with a specified amount of explosive and wired for detonation. Once the area is prepared, a chain-link fence and a blast mat (rubber belting) would be placed over the area. Warning horns would sound before detonation. Blasting is usually over in a matter of seconds. It is estimated that it would take about three weeks to blast and remove approximately 1,200 cy of concrete.

The noise level for controlled blasting would be about 138 decibels (dB) at 50 feet for a few seconds; a vibrating hammer breaking concrete produces a noise level of 113 dB at 50 feet. The peak particle velocity for controlled blasting would be approximately 1.25 inches/second for objects within 300 feet, which is below the level that poses a risk of damage to structures of 2 inches/second.



SOURCE: Weiss Associates, 2004

Sunol-Niles / 201591 ■

Figure 7
Sunol Dam -
Final Plan/Elevation

The third demolition method would involve the use of a chemical expansive agent (also referred to as "soundless chemical demolition agents" [SCDAs]). The main component of SCDAs is calcium oxide, which forms calcium hydroxide when water is added. SCDAs are powdery materials that expand considerably when mixed with water. After the SCDA is mixed, it is placed in boreholes drilled into the concrete. The boreholes are approximately 1 to 2 inches in diameter and spaced less than 2 feet apart. Depending on the type of SCDA, significant expansive pressure causes fracturing in between 15 minutes and 24 hours. The split concrete is removed by conventional methods. SCDAs do not generate noise, flying rock, vibration, or toxic fumes (SFPUC, 2005; Emerging Construction Technologies, 2005).

Access and Roads

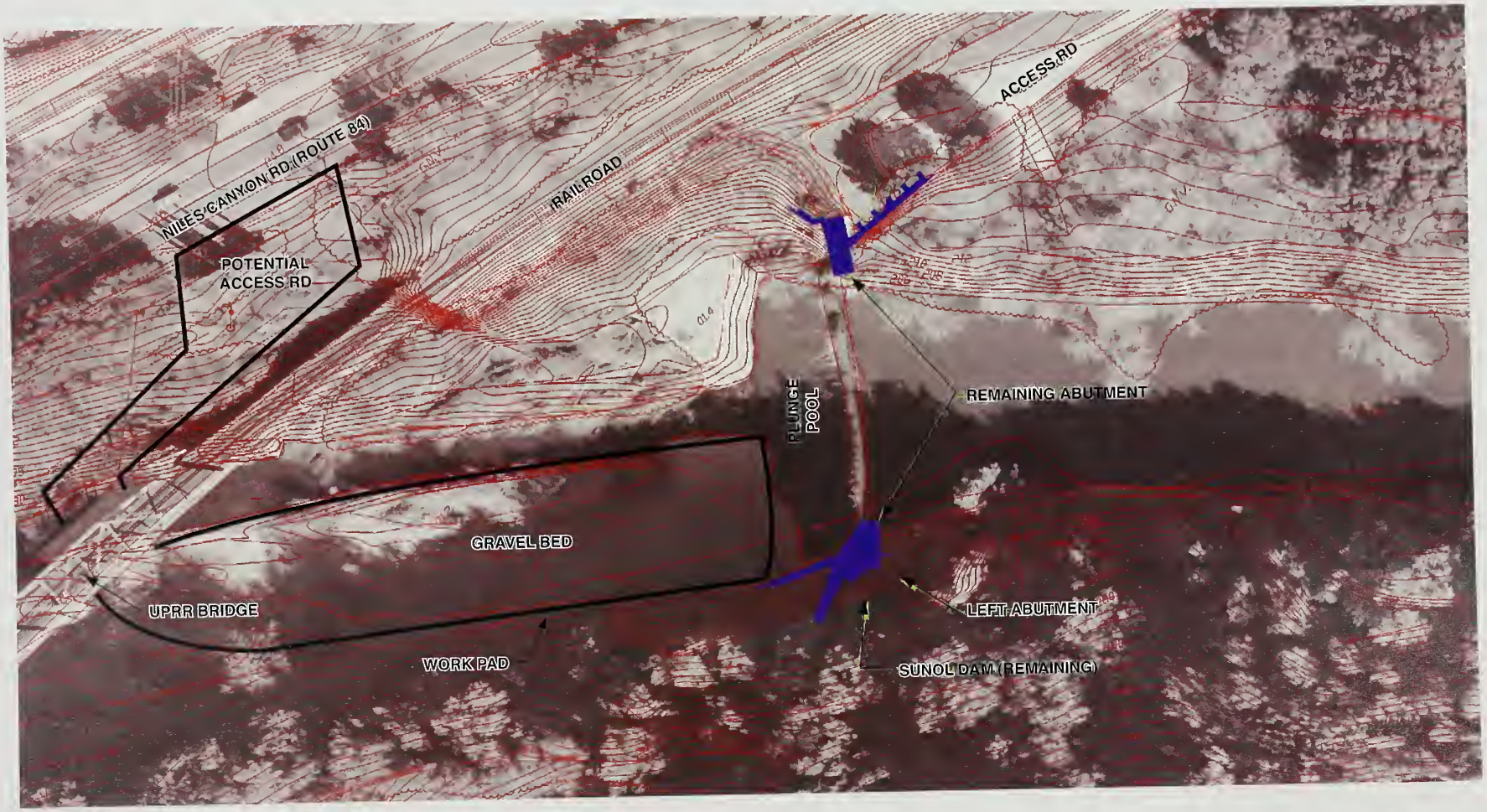
General access to the Sunol Dam project site would be provided by an existing access road (see Figure 8) along the north side of Alameda Creek. Construction vehicles would travel through an adjacent nursery's internal roadway off of SR 84 (see Figure 5) to access this road, which is on land owned by the SFPUC and is not accessible to the public. The nursery's driveway is not fully improved, but is regularly used by trucks and private vehicles. The access road would be widened in areas where there are no mature trees and would allow trucks to be staged until they are needed to off-haul debris such as vegetation, concrete, and sediment.

There are two options for getting heavy equipment to the face of the dam, both of which are evaluated in this DEIR. The first option would be to construct an access ramp at the end of the existing access road leading to the dam (see Figure 8). The temporary access ramp would be constructed at a 6 percent grade down to Alameda Creek. This option would initially require importing fill down to the channel, where native gravels and cobbles could be used to complete the ramp. The ramp would be built and then closed for the installation of the diversion pipe. Once the ramp has been completed, a heavy timber deck or imported gravels would be needed to get the equipment across the creek channel to access the gravel bars on the left side of the creek.

Temporary access from SR 84 could also be obtained by cutting an access road to the right bank of the creek (looking downstream). Vegetation in this area is sparse. A heavy timber deck would be placed across the creek underneath the Union Pacific Railroad (UPRR) bridge downstream of the dam structure (see Figure 8). This option would allow heavy equipment to use the large, exposed gravel beds that extend up to the plunge pool to access the dam face. This access route could be provided in addition to the route described above.

Once heavy equipment has access to the gravel area, gravels and cobbles would be used to construct a "padded up" work area to get an excavator with a hydraulic hammer attachment up to the face of the dam structure.

The majority of traffic related to removal of the dams would involve trucks hauling debris. At the Sunol Dam site, up to 1,200 cy of material would be removed. If 10-cy-capacity trucks were used,



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NOT TO SCALE

SOURCE: Weiss Associates, 2004

Sunol-Niles / 201591 ■

Figure 8
Sunol Dam Aerial - Topo View

approximately 120 one-way truck trips would be generated. Given a three-month timeframe, approximately one truck trip per day[8] would exit from the site.

Demolition activities would include trips by work crews and dam removal equipment as well as trips to set up operations. The typical crew size would be 15 people, plus SFPUC inspectors for each site. Worker trips traveling to and from each worksite would be approximately 23 round-trips (46 one-way trips) per day, for a total of 46 round-trips (92 one-way trips) for both dams. The removal would occur in periodic activity peaks, requiring brief periods of considerable effort followed by longer periods of reduced activities.

Staging, Equipment and Materials Storage

The contractor's office, including employee parking and equipment and materials storage, would be located at the entrance to Sunol Dam's access road across from the old chlorine injection building, on land currently leased by a nursery (see Figure 5). Employees would use this area to park vehicles and store personal belongings. Equipment could be left onsite at the end of each workday. If equipment and/or materials are to be left within Alameda Creek at the end of a workday or over a weekend during demolition activities, a containment system (e.g., temporary berms) would be installed around equipment and/or materials to prevent the accidental release of hazardous materials into Alameda Creek. In addition, secondary containment, such as a drain pan or drop cloth, to catch spills or leaks would also be used. Spill cleanup kits would be located onsite, and all diversion structures and pumps (if necessary) would be inspected before the end of the workday to ensure their proper functioning.

Impounded Sediment

The estimated volume of sediment behind Sunol Dam is 37,000 cy. After the dam is removed, sediment that is not used to fill in the downstream plunge pool or for general recontouring in the area would be left in place to move downstream naturally over a period of several decades.

The impounded sediments behind Sunol Dam were tested for hazardous materials (Geomatrix Consultants, 2004). Selected samples from each of the seven vibracores[9] collected were submitted for laboratory testing, for both environmental (chemical analytical) and geotechnical (grain-size distribution) purposes. Polychlorinated biphenyls (PCBs), polynuclear aromatic compounds, pesticides, and total petroleum hydrocarbons (TPH) as motor oil were not detected in any of the samples. TPH as diesel was detected in two samples at low levels (1.2 milligrams per kilogram [mg/kg] and 1.1 mg/kg). Metals were detected at low concentrations—well below regulatory criteria for disposal. The detected concentrations were also below accepted background concentrations (except for one detection of nickel, which was just above background levels).

[8] The actual result is 1.2 trucks, but this number was rounded to the nearest whole number.
[9] Vibracore sampling is a sediment sampling method in which the sampling pipe is "vibrated" downward instead of using the conventional method of drilling.

Site Restoration and Revegetation

Site restoration activities would be part of the project and would proceed as phases of dam removal are completed. Site restoration consists of two phases: the first phase involves restoring disturbed areas such as access roads. An erosion control plan would be implemented to winterize the site. The second phase involves revegetation (i.e., the planting of native trees and shrubs), which would be required due to changes in groundwater levels. This phase would commence a year or two following the completion of dam removal in the former backwater area of Sunol Dam. This delay in revegetation would allow the area to stabilize before planting.

Removal Schedule

Demolition and associated activities at the Sunol Dam project site are expected to occur between May and November of 2006. In-channel work would begin in June and conclude by October, unless otherwise authorized by the California Department of Fish and Game (CDFG). The schedule is approximately three months, within the windows noted above. The dams would be removed concurrently.

Niles Dam

Diversion/Dewatering of Alameda Creek

As with Sunol Dam, there are three methods to dewater the creek. The first option consists of installing a small cutoff dam at the upstream end of the proposed work area and installing an approximately 36-inch-diameter pipeline with flexible mechanical couplings below the dam. The pipeline might need to be moved as work progresses. Diverted water would be discharged below the work area, which would be isolated by a downstream cutoff dam.

A second option would be to construct a diversion channel or trench along the left bank of Alameda Creek.[10] The channel or trench would be lined with plastic sheeting to prevent seepage into the work area and to improve the flow capacity of the diversion channel. The channel would be designed to minimize the removal of trees and vegetation. A short segment of culvert would be installed near the upper end of the channel to allow equipment access across the diversion channel. Immediately downstream of where the diversion channel would connect to Alameda Creek, a continuous row of interlocking sheetpiles would be installed across the creek bank to cut off flow to the work area and to allow creek flows to enter the diversion channel. Immediately downstream of the sheetpiles, dewatering pumps would be installed to reduce and control the amount of water entering the worksite. These pumps would discharge into plastic-lined settling basins that would be constructed from the existing channel. The settling basins would be slightly higher than the diversion channel to allow for gravity flow into the channel. Similar sediment control features, such as silt fences, would be placed at the end of the settling basin to filter

[10] There appears to be an abandoned, or flood, channel about 30 feet from the left bank of Alameda Creek that could be excavated and used as a diversion channel; however, it is not known at this conceptual stage whether this channel could be used.

sediment and prevent fines from entering the diversion channel and subsequently Alameda Creek. The diversion channel would re-enter Alameda Creek just downstream of Niles Dam.

As with Sunol Dam, native gravel and cobbles would be placed downstream of Niles Dam to form a low-height dam with a small, gated dewatering pipe. The dewatering pipe would prevent any turbid water produced at the worksite from entering Alameda Creek. It would also prevent any accidental fuel or oil spill from entering Alameda Creek. Sediment control features and oil-absorbent materials would be placed around the diversion pipe to further filter debris and prevent unwanted fines or contaminants from entering Alameda Creek.

The third option consists of isolating one-half of Niles Dam, as described above for Sunol Dam, performing demolition work, and then isolating the other half of the dam for removal (see Figure 6a).

Dam Removal

Niles Dam would be lowered to an elevation of approximately 108.4 feet, which is the estimated historic pre-dam bed elevation and is 6.9 feet below the dam crest (see Figure 9). However, the actual height of the dam is not known with certainty, and therefore the depth of removal could be greater than 6.9 feet. The limits of dam removal would be established during predemolition surveys. In addition, the left abutment would be removed in its entirety, and as much of the right abutment as geotechnically feasible would be removed (see Figure 10). Portions of the right abutment are adjacent to SR 84. Between 200 and 800 cy of sediment stored behind Niles Dam would be used to fill in the downstream plunge pool.

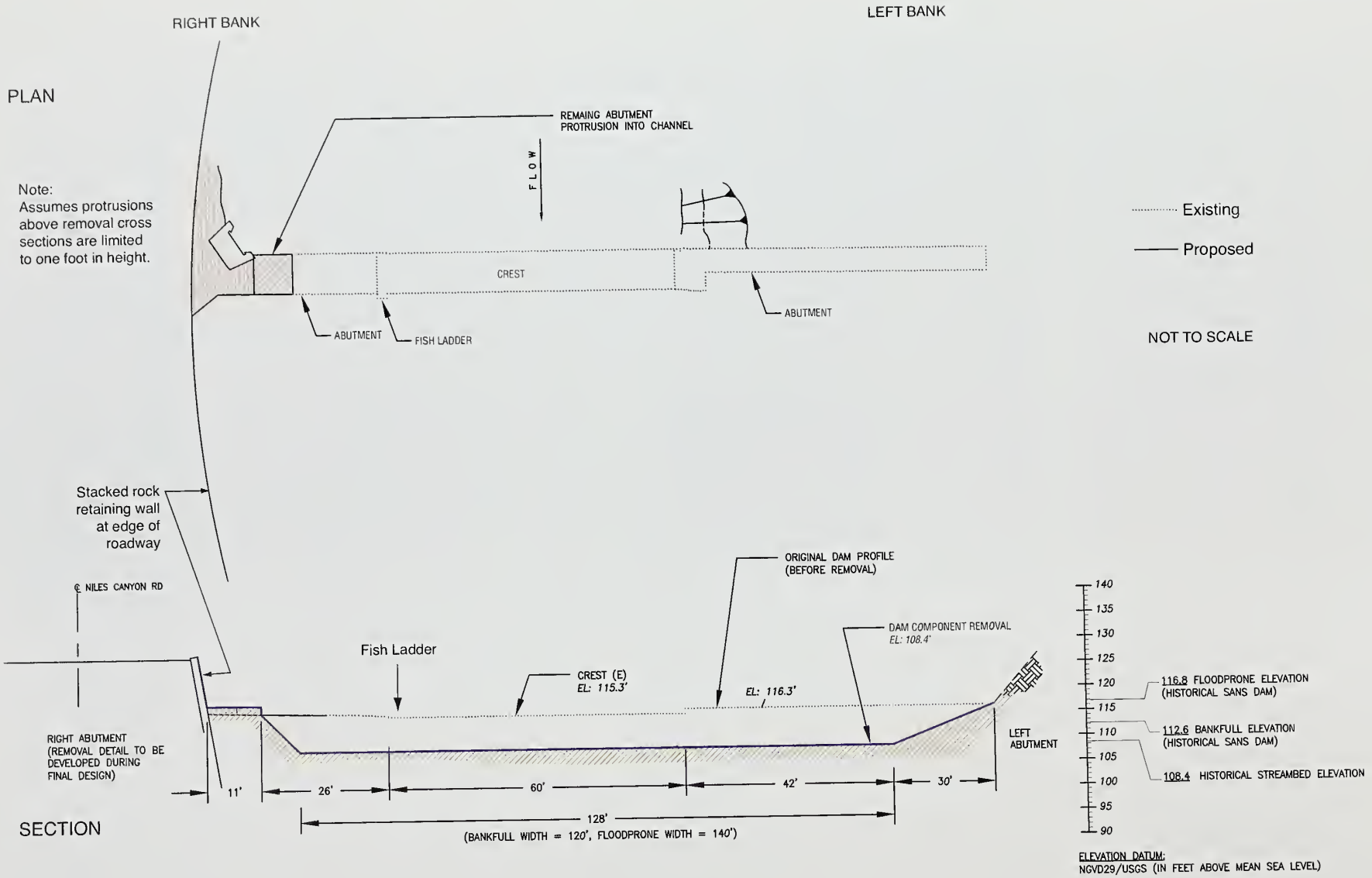
Removal Methods

The removal of Niles Dam would be accomplished by one or more of the methods, as described under Sunol Dam, Removal Methods.

Installation of the diversion/dewatering system would be performed using small equipment. Installation of the sheetpiles would be accomplished by using an excavator fitted with a vibratory driving attachment. An excavator or small bulldozer would be needed to build up a work platform or deck above the waterline. Imported gravel would be required to create a work area immediately adjacent to the roadway and the beginning of the access ramp. Native gravel and cobbles from the creekbed could then be used to advance the work platform into the creek and complete the access ramp. As the platform is advanced, the excavator would vibrate the sheetpiles into place.

Access and Roads

Access to the Niles Dam site is limited because of its location. It lays perpendicular to SR 84, which has narrow or no shoulders. On the opposite bank, the railroad embankment rises approximately 150 feet away from the left abutment of Niles Dam. Two options are currently being considered to allow heavy machinery and ancillary equipment to access the site. Both options are evaluated in this DEIR.



SOURCE: Weiss Associates, 2004

Sunol-Niles / 201591 ■

Figure 9

Niles Dam Final Plan Elevation

SOURCE: Weiss Associates, 2004

Sunol-Niles / 201591 ■

Figure 10
Niles Dam Aerial/Topo View

Access via the Niles Canyon Railroad

The Niles Canyon Railroad (NCRR)[11] is located on the left side of the dam, downstream of the dam structure (see Figure 11 in Section IV.E, Geology, Soils, and Seismicity). The NCRR has a yard area in Sunol (see Figure 4) where equipment and debris could be handled. Initial conversations with the nonprofit NCRR organization indicate that using the NCRR is feasible as long as heavy equipment, either rubber-tired or track-mounted, would not cross the bridge immediately upstream of the dam site (Geomatrix Consultants, 2004). All equipment would have to be loaded on flatbed cars and transported to the site. The railroad is approximately 35 feet higher than Alameda Creek at the dam site, requiring some form of heavy timber platform and access ramp to be installed.

Access via SR 84

SR 84 is a single-lane roadway in each direction with a few small shoulder areas for the length of the project area (see Figure 10). It serves as part of the commute corridor between Sunol and Fremont. Peak traffic hours are during weekdays in the morning and evening. At the Niles Dam site, a rock retaining wall separates the roadway from the dam and Alameda Creek.

To use SR 84 for dam and debris removal, the eastbound lane would need to be closed to allow trucks to be staged and loaded. Flaggers and a pilot car would be needed at each end of the road control area to allow public vehicles to pass the construction site. In addition, signs as well as battery or solar flashing warning lights would need to be placed in the vicinity well in advance of the work; due to SR 84 conditions, extra signs and warning lights would need to be used.

The California Department of Transportation (Caltrans) has, and does allow for, limited road control during nonpeak times (i.e., during non-commute hours), and Caltrans closes sections of SR 84 each year (typically on Sunday) to remove vegetation and perform maintenance. To reduce the traffic impacts of using SR 84, the loading tasks would need to be scheduled during nonpeak hours and could occur on weekends. Caltrans would require a traffic control plan and would need to approve the plan before the start of construction.

It is estimated that approximately 800 cy of material would be removed from Niles Dam. If 10-cy-capacity trucks were used, approximately 80 one-way truck trips would be generated. Given a two-month timeframe, the proposed project would generate about two truck trips per day. For information on work crews, see Access and Roads under Sunol Dam, above.

Additional Access Considerations

Because of the proximity of Niles Dam to SR 84, there are other access considerations unique to the Niles Dam site. These are:

- Initial Access. Access for the initial staging of equipment into the project area, specifically onto the left bank of Alameda Creek, is critical to installing the diversion/dewatering systems.

[11] Shown on some figures as the "Southern Pacific Railroad."

- Frequent Access. Once the diversion equipment has been installed and is operational, daily access would be needed to get construction personnel and equipment to the site. Near-daily access would be needed to refuel and maintain equipment. Biweekly access would be required to remove garbage and debris.

Staging, Equipment and Materials Storage

Due to site access issues at Niles Dam, the construction office and primary staging area would be at the same location as for the Sunol Dam. As with Sunol Dam, equipment and/or materials may be left onsite and/or within Alameda Creek. For further information, see Staging, Equipment and Materials Storage for Sunol Dam.

Impounded Sediment

Sediment stored behind Niles Dam is estimated to be 2,200 cy (Weiss Associates, 2004). As described for Sunol Dam, sediment would be left in place to move downstream naturally, except for the amount used to fill in the downstream plunge pool or used for general recontouring in the area after dam removal.

Field observations along with grain-size data for Niles Dam indicate that the sediments behind the dam are coarser than those at Sunol Dam. Given this information, and the poor recovery obtained in the vibracores at Sunol Dam, sediment sampling at Niles Dam was not attempted. Based on the results of the laboratory testing performed on sediments collected behind Sunol Dam, and on communications with the Alameda County Flood Control and Water Conservation District and Zone 7 Water Agency regarding dredging of Alameda Creek and Arroyo de la Laguna, the sediments impounded behind Niles Dam are likely free of potentially hazardous substances or have concentrations of such substances that are well below regulatory limits for disposal (Geomatrix Consultants, 2004).

Site Restoration and Revegetation

See Site Restoration and Revegetation under Sunol Dam.

Removal Schedule

Demolition and associated activities at the Niles Dam project site are expected to occur between May and November of 2006. In-channel work would begin in June and conclude by October, unless authorized by the CDFG. The schedule is approximately two months, within the windows noted above.

D. Approvals/Permits Required

The project would require the following approvals and/or permits:

1. CDFG Streambed Alteration Agreement; CDFG 2081 Agreement

2. San Francisco Bay Regional Water Quality Control Board water quality certification under Section 401 of the federal Clean Water Act or an authorization for waste discharge under the Porter-Cologne Water Quality Control Act

3. U.S. Army Corps of Engineers Nationwide Permit

   a. U.S. Fish and Wildlife Service incidental take permit
   b. National Marine Fisheries Service incidental take permit
   c. National Historic Preservation Act, Section 106 compliance

4. Caltrans Encroachment Permit

References

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CHAPTER IV
Environmental Setting and Impacts

This chapter describes the environmental setting and analyzes the potential impacts associated with the removal of Sunol and Niles Dams. As described in Chapter II, this chapter provides the detailed analysis of environmental issues. The environmental setting presents both regional context and site-specific details of the existing conditions to provide a basis for identifying potential impacts due to project implementation. This chapter also includes, for each environmental issue, a description of significance criteria used in analyzing potential impacts. Based on these criteria, impacts determined to be significant or potentially significant would require mitigation measures. The impact analysis indicates whether or not mitigation measures are available to reduce impacts to a less-than-significant level; the reader is referred to Chapter V for a detailed description of mitigation measures. In some cases where impacts are determined to be less than significant, the impact analysis recommends improvement measures that could reduce adverse effects or temporary disruption; however, these measures are not required under the California Environmental Quality Act (CEQA).

A. Compatibility with Local Plans and Policies

The City and County of San Francisco, as a chartered city and county, and the San Francisco Public Utilities Commission (SFPUC), as a public utility, receive intergovernmental immunity under California Government Code Sections 53090 et seq. Such immunity exempts the extraterritorial lands owned by the City and County of San Francisco, through the SFPUC, from the planning and building laws of any other city or county in which those lands are located. Thus, the zoning and building codes, general plans, specific plans, and other planning and building policies of Alameda County, or various regional plans, do not apply to this project. The SFPUC has authority over the management, use, and control of its extraterritorial lands under the San Francisco City Charter, Section 4.112 (San Francisco City Charter, 2004).

San Francisco's planning and building laws, to the extent that they apply to San Francisco's extraterritorial lands, could be applicable to the proposed project, as long as they do not conflict with the SFPUC's charter responsibilities. Similarly, the *San Francisco General Plan* (City of San Francisco, 1996) applies primarily to lands within the City and County of San Francisco, and there are no specific policies directed to areas outside of these boundaries, although general environmental resource policies in the *San Francisco General Plan* could be applicable to the project site. The *San Francisco General Plan*, which provides general policies and objectives to guide land use decisions, contains some policies that relate to physical environmental issues. The compatibility of the project with policies that do not relate to physical environmental issues will

be considered by decision makers as part of their decision to approve or disapprove the proposed project; any potential conflicts identified as part of that process would not alter the physical environmental effects of the proposed project.

The SFPUC seeks to manage its lands in a way that is consistent with San Francisco's planning and building laws and works cooperatively with local jurisdictions to avoid conflicts with local planning and building laws. Nevertheless, the laws of other jurisdictions are nonbinding on the SFPUC's management of its lands. The referenced excerpts from the general plans of Alameda County and various regional plans are presented in this report for informational purposes only.

Setting

Project Area

The proposed project area lies along State Route 84 (SR 84) in Alameda County, east of Fremont, between the communities of Niles and Sunol (see Figures 1 and 2). SR 84 parallels Alameda Creek and intersects SR 238 to the west of the project area and Interstate 680 (I-680) to the east. Sunol and Niles Dams are located on Alameda Creek in the Alameda Creek watershed.

The Alameda Creek watershed contributes to the SFPUC water supply. The dams were built as part of the SFPUC water supply system. Due to system upgrades, they no longer aid in the provision of water to downstream portions of the system.

Niles Dam

Niles Dam is located approximately two miles east of Niles District, a section of the city of Fremont. The Niles Dam project site is located at the eastern edge of Fremont and is surrounded by low-density development (City of Fremont, 2004). The Niles Dam site has three land use designations under the *Fremont General Plan*: Hill Face Open Space (Development Reserve Boundary), Hill Open Space (Development Reserve Boundary), and Hill Open Space (City of Fremont, 2004). The Niles Canyon Railroad (NCRR, right-of-way formerly owned by the Southern Pacific Railroad) runs along the south bank of Alameda Creek about 150 feet southeast of the dam. The right-of-way is owned by Alameda County (City of Fremont, 2001). The Union Pacific Railroad (UPRR, formerly owned by the Western Pacific Railroad) right-of-way runs adjacent to the south bank of Alameda Creek about 2,000 feet south of the dam. The northern bank of Alameda Creek rises steeply and has limited vegetation. Vargas Plateau Regional Park, which is designated as Parklands in the *Fremont General Plan*, lies just south of the site across the UPRR right-of-way.

Sunol Dam

Sunol Dam is located in unincorporated Alameda County adjacent to the community of Sunol along SR 84 east of Niles Dam. Its land use designation in the Alameda County *East County Area Plan* is Agriculture (Alameda County, 2002). The UPRR and the NCRR, which generally run parallel to Alameda Creek in Niles Canyon, lie about 100 and 300 feet to the north, respectively,

on either side of SR 84. The northern bank of Alameda Creek adjacent to Sunol Dam is characterized by dense riparian vegetation. A commercial (garden) nursery occupies the low-lying, flat area along the north side of the dam and its upstream reservoir. According to the *East County Area Plan* (Alameda County, 2002), the primary land use designations in the vicinity of Sunol Dam are Agriculture, Water Management, and Resource Management.

Plans and Policies

The SFPUC is in the process of preparing a habitat conservation plan for the Alameda Creek watershed. Currently, there are no habitat conservation or natural community plans for the project area. Plans and policies adopted for the project area are summarized below and are presented for informational purposes only.

Alameda County General Plan

East County Area Plan

The *East County Area Plan* (ECAP), one of the three area plans that make up the *Alameda County General Plan*, addresses unincorporated areas of Alameda County. The other two area plans are the *Castro Valley Area Plan* and the *Eden Area Plan*. The ECAP, adopted in May 1994 (last amended 2002), includes the cities of Dublin, Pleasanton, Livermore, and small portions of Hayward. The *Alameda County General Plan* also includes five countywide functional elements: the Regional Element, Housing Element, Energy Element, Natural Resources and Open Space Element, and the Safety and Noise Element. The Sunol Dam site is located in the unincorporated portion of Alameda County in the planning area addressed by the ECAP.

General Open Space

Policy 52: The County shall preserve open space areas for the protection of public health and safety, provision of recreational opportunities, production of natural resources (e.g., agriculture, windpower, and mineral extraction), protection of sensitive viewsheds, preservation of biological resources, and the physical separation between neighboring communities.

Sensitive Viewsheds

Policy 116: The alternation of natural topography, vegetation, and other characteristics by grading, excavating, filling or other development activity shall be minimized. To the extent feasible, access roads shall be consolidated and located where they are least visible from public view points.

Policy 117: The County shall require that where grading is necessary, the offsite visibility of cut and fill slopes and drainage improvements is minimized. Graded slopes shall be designed to simulate natural contours and support vegetation to blend with surrounding undisturbed slopes.

Policy 118: The County shall require that grading avoid areas containing large stands of mature, healthy vegetation, scenic natural formations, or natural watercourses.

Policy 119: The County shall require that access roads be sited and designed to minimize grading.

Biological Resources

The goal of the ECAP as it pertains to biological resources is, "To preserve a variety of plant communities and wildlife habitat."

Objective 1. Tree Preservation

Policy 110: Alameda County requires that developments are sited to avoid or, if avoidance is infeasible, to minimize disturbance of large stands of mature, healthy trees and individual trees of notable size and age. Where healthy trees are removed, the County requires a tree replacement program which includes a range of tree sizes, including specimen-sized trees, to achieve immediate visual effect while optimizing the long-term success of the replanting effort.

Objective 2. Special-Status Species Preservation

Policy 125: The County encourages preservation of areas known to support special-status species.

Objective 3. Preserve and Protect Streams, Creeks, and Wetland Habitat

Policy 126: The County encourages no net loss of riparian and seasonal wetlands.

Policy 129: The County encourages the preservation of East County oak woodland plant communities and riparian woodland habitat present along Arroyo Mocho, Arroyo Las Positas, Alamo Canal, and Tassajara and Alameda Creeks.

Cultural Resources

Goal: To protect cultural resources from development

Policy 136: The County shall identify and preserve significant archaeological and historical resources, including structures and sites which contribute to the heritage of East County.

Policy 137: The County shall require development to be designed to avoid cultural resources or, if avoidance is determined by the County to be infeasible, to implement appropriate mitigation measures that offset the impacts.

Noise

Goal: To minimize East County residents' and workers' exposure to excessive noise

Policy 288: The County shall endeavor to maintain acceptable noise levels throughout East County.

Program 104: The County shall require the use of noise reduction techniques (such as buffers, building design modifications, lot orientation, soundwalls, earthberms, landscaping, building setbacks, and real estate disclosure notices) to mitigate noise impacts generated by transportation-related and stationary sources, as specified in the *California Office of Noise Control Land Use Compatibility Guidelines.*

Alameda County General Code

County Native and Heritage Tree Ordinances

Alameda County has adopted a tree ordinance for the regulation of trees within the county right-of-way (General Ordinance Code of Alameda County, Title 12, Chapter 12.11). Planting, maintaining, or removing any tree from the county right-of-way and all associated facilities are subject to the permitting requirements of the ordinance.

Alameda County Public Works Agency

Grading Ordinance

The purpose of this ordinance is to monitor construction projects to control sedimentation in the streams and creeks and, ultimately, the Bay.

Watercourse Protection Ordinance

The purpose of this ordinance is to safeguard and preserve watercourses, protect lives and property, prevent damage due to flooding, protect drainage facilities, control erosion and sedimentation, restrict discharge of polluted materials, and enhance recreational and beneficial uses of watercourses.

Stormwater Management and Discharge Control Ordinance

The purpose of this ordinance is to ensure the future health, safety, and general welfare of county citizens by:

- Eliminating non-stormwater discharges to the municipal separate storm drain
- Controlling the discharge to municipal separate storm drains from spills, dumping, or disposal of materials other than stormwater
- Reducing pollutants in stormwater discharges to the maximum extent practicable

The intent of this ordinance is to protect and enhance the water quality of watercourses, water bodies, and wetlands in Alameda County in a manner pursuant to and consistent with the Clean Water Act.

San Francisco Public Utilities Commission

Alameda Watershed Management Plan

Both dams are located in the Alameda Creek watershed under the jurisdiction of the SFPUC. In February 2004, the SFPUC published the *Alameda Watershed Management Plan* (SFPUC, 2004a). The plan provides guiding policy for land use at the project sites. The primary goal of the plan is "to maintain and improve source water quality to protect public health and safety." Relevant secondary goals are to: (1) maximize water supply, and (2) preserve and enhance the ecological and cultural resources of the watershed. The plan requires the development of a habitat

conservation plan to mitigate the potential impacts of ongoing operations and maintenance activities on plants and wildlife.

Policy WQ25: Wherever possible, preserve and protect stream channels and banks in the primary watershed to protect water quality by maintaining or improving channel stability and reducing bank erosion.

Policy WQ27: Prohibit swimming, boating, and windsurfing and other body contact activities in all water sources.

Policy WQ28: Strictly control public access to minimize adverse effects to water quality.

Policy WQ29: Actively enforce penalties and other standard enforcement procedures on activities that adversely affect water quality.

Policy WS8: Minimize the release of water that cannot be recaptured.

Alameda Watershed Habitat Conservation Plan

The SFPUC is currently preparing the *Alameda Watershed Habitat Conservation Plan*, with a projected completion date of 2008. The plan will address important species and their associated habitats in the Alameda Creek watershed. Preliminary goals and objectives (SFPUC, 2004b) include:

Goal #4: Increase the quality and quantity of accessible habitat (for in-migration, spawning, juvenile rearing, and out-migration) for covered fish species.

Objective 4A: Ensure adequate instream flows to facilitate fish passage through the Sunol Valley during peak periods of adult upstream migration and juvenile downstream migration of anadramous fish.

Objective 4B: Provide suitable depth and temperature regimes to support spawning and rearing habitat of covered fish species in Alameda Creek and Calaveras Creek downstream of Calaveras Reservoir.

Objective 4C: Provide for movement of steelhead and facilitate movement of lamprey through Niles and Sunol Valley by 2007.

Fremont General Plan

The Niles Dam site is located in the city of Fremont. The *Fremont General Plan* (amended 1996) includes goals and policies applicable to the project.

Land Use

Goal LU 6: Protection of the sensitive Hill Face and uses in the remainder of the Hill Area consistent with its character and environmental constraints.

Policy LU 6.9: Early assessment of environmental constraints and resources should be conducted and submitted with applications for development. Early consultation with the City regarding the implications of the environmental assessment for proposed development is recommended. Issues to be addressed include geology (e.g., seismicity, soils, slope),

biology (e.g., wetlands and riparian zones, landmark trees), mineral resources, and visual sensitivity.

Policy LU 6.16: The Alameda Creek watershed that drains to the Sunol Valley should be protected from significant negative impacts.

Policy LU 6.19: All development shall be designed to minimize disturbances of the natural terrain and vegetation.

Policy LU 6.29: Hill Area road standards shall reflect the need to minimize scarring, earth movement, and the potential for erosion and ground failure, and the need to respect the natural topography of the area.

Open Space

Objective OS 1.1: Protection of the Hill Face, ridgeline, and stream corridors.

Natural Resources

Objective NR 7.2: Maximize the biological, aesthetic, and recreational benefits of natural watercourses, flood control, and water recharge facilities.

Policy NR 7.2.2: Encourage water agencies (Alameda County Water District [ACWD] and Alameda County Flood Control and Water Conservation District [ACFCWCD]) to improve the natural characteristics of their existing water and flood control facilities.

Implementation 1: Work with ACWD and ACFCWCD to identify waterways with potential for improving biological, aesthetic, and recreational character. Encourage these agencies to devote necessary resources to improving the quality of these areas.

Implementation 2: Identify state and federal sources, and consider the use of local funding sources to upgrade the character of existing water and flood control facilities.

Transportation

Policy T 1.1.3: Maintain roadways in good condition.

Policy T 1.2.2: Limit access to parkways and arterials to maintain capacity, efficiency, and safety of traffic flow.

Policy T 1.3.2: Encourage through truck traffic to use interstate highways rather than local truck routes in Fremont.

Policy T 1.3.3: Protect neighborhoods from intrusion by truck traffic.

Policy T 1.4.3: Promote bicycle travel.

Noise

Objective HS 8.1: A noise environment which meets standards.

Policy HS 8.1.4: Control noise at its source to maintain existing noise levels, and in no case to exceed the acceptable noise levels as established in the *Land Use Compatibility for Community Exterior Noise Environments*.

Implementation 1: Consider adopting a noise ordinance to control noise-generating activities such as horns, unmufflered engines, loudspeakers, etc.

Historical Resources

Although primacy is given to historic park protection within the *Fremont General Plan*, Appendix I of the General Plan also provides a list of primary historic resources identified in City Council Resolution 5463 in 1982. No local registries of historic resources (e.g., maintained by the City of Fremont or Alameda County) have identified resources within the project area.

San Francisco General Plan

The *San Francisco General Plan* (City of San Francisco, 1996) applies primarily to lands within the City and County of San Francisco. There are no specific policies directed to areas outside of these boundaries, although the goals, objectives, and policies in the Environmental Protection Element of the plan shown below are applicable to the project.

Objective 1. Achieve a proper balance among the conservation, utilization, and development of San Francisco's natural resources.

Policy 1.1: Conserve and protect the natural resources of San Francisco.

Policy 1.2: Improve the quality of natural resources.

Policy 1.3: Restore and replenish the supply of natural resources.

Policy 1.4: Assure that all new development meets strict environmental quality standards and recognizes human needs.

Objective 2. Implement broad and effective management of natural resources.

Policy 2.1: Coordinate regional and local management of natural resources.

Impacts

This section addresses potential conflicts with any adopted environmental plans and goals of the City of San Francisco. Conflict with a plan, policy, or goal does not, in itself, indicate a significant effect on the environment under CEQA. As stated in CEQA Guidelines Section 15358(b), "Effects analyzed under CEQA must be related to a physical change." To the extent that physical impacts could result from such conflicts, such physical impacts are analyzed herein.

Significance Criteria

The City of San Francisco has not formally adopted significance standards for impacts related to inconsistency with plans and policies, but generally considers that implementation of the proposed project would have a significant plan or policy impact if it were to:

- Substantially conflict with established local, regional, state, or federal plans, policies, and/or guidelines, and as a consequence of such conflict, could potentially result in an adverse physical impact on the environment.

Impact Analysis

Project Consistency with Policies

The policies described above generally support the protection of the Alameda Creek watershed. The most common issue addressed by the applicable goals, policies, and programs is watershed protection for the purposes of open space preservation, water quality, improvement of fish habitat, and water supply.

The City of Fremont, however, values watershed protection for the purposes of maximizing biological, aesthetic, and recreational benefits of natural watercourses (Objective NR 7.2). This objective recognizes the multiple purposes of the watershed. Although the project would remove an unsanctioned recreational resource, it is assumed that the project's fish passage and public safety benefits are consistent with the spirit and intent of the *Fremont General Plan*. The *Alameda Watershed Management Plan* contains policies to limit public access to waterways to maintain water supply and water quality. The policies of the *Alameda Watershed Management Plan* are consistent with Objective #3.

The gradual release of sediment from the project area following dam removal would not conflict with the Alameda County Public Works Agency's Watercourse Protection Ordinance. As discussed in Chapter III, Project Description, and Section IV.F, Hydrology, Groundwater, and Water Quality, the release of sediment would occur gradually over a period of decades and would not significantly affect the sediment load of Alameda Creek. To the extent that demolition activities could result in a conflict with the ordinance, such potential environmental effects have been identified and mitigation measures provided in Chapter V, Mitigation Measures, under Section IV.F, Hydrology, Groundwater, and Water Quality.

Alameda County and the City of Fremont both address issues regarding grading in their general plans. Both jurisdictions emphasize minimizing grading impacts to natural topography and vegetation as well as in design of access roads. The project as described in Chapter III, Project Description, minimizes grading impacts.

Policies related to the direct impacts of demolition, such as traffic, utilities and public services, biological resources, geology and topography, and cultural resources, are addressed in Chapter V, Mitigation Measures, under the corresponding headings. Potential growth-inducing and cumulative impacts are discussed in Section IV.H, Other Environmental Issues.

As stated above, local planning and building laws are not applicable to the extraterritorial lands owned by the City and County of San Francisco. In general, potential conflicts of a proposed project on extraterritorial lands with the planning laws of other jurisdictions are considered by decision-makers, including the SFPUC, independently of the environmental review process as a part of the decision to approve, modify, or disapprove a proposed project. The EIR analyzes and provides information on the potential environmental impacts of implementing the proposed project.

There are no substantial conflicts with any of the plans and policies described in this section, given that the project would remove facilities that are no longer used for water service, that pose a barrier to fish migration, and that present an existing public safety hazard.

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B. Transportation, Circulation, and Parking

Setting

This section discusses existing transportation and traffic facilities within the project area and vicinity, presents the regulatory framework, and provides an analysis of impacts to these facilities that could result from the partial removal of Sunol and Niles Dams.

Roadway Network

The general roadway network within the project area is shown in Figure 4. Regional access to the project area is provided by two primary freeways: Interstate 880 (I-880), located approximately seven miles to the west; and I-680, located approximately two miles to the east. I-880 serves as a primary north-south regional route through the East Bay, extending between I-80 in Oakland and I-280/State Route (SR) 17 in San Jose. I-680 also serves as a primary north-south regional route, extending between I-80 in Solano County and U.S. 101/ I-280 in San Jose. SR 238 is an alternate north-south regional-serving route, extending from I-880 in San Leandro to the north, and I-680 in Fremont to the south. SR 238 follows along Mission Boulevard and consists of a four-lane arterial, with a posted speed limit of 45 miles per hour (mph), in the vicinity of SR 84.

SR 84 provides both local access to the project area and connection to regional routes, extending between I-880, points west and I-680, and points east. Within the project vicinity, SR 84 follows along Alameda Creek. SR 84 is a two-lane, gently winding arterial, with narrow to no paved shoulders. The maximum posted speed limit on SR 84 is 45 mph, with a recommended speed limit of 30 mph at some curves. SR 84 contains two narrow bridges along its length. SR 84 also crosses under the adjacent railroad three times, with vertical clearances beneath the crossings as low as 14 feet 5 inches.

To the east of the project area, SR 84 continues east along Palomares Road (two-lane arterial) connecting to I-680. Alternate access to I-680 is provided by Pleasanton-Sunol Road. To the west, SR 84 continues along Mission Boulevard, Mowry Avenue, Peralta Boulevard, Fremont Boulevard, and Decoto Road (four- to six-lane arterials), where it develops into a freeway. Within the city of Fremont, SR 84 and SR 238 are designated truck routes.

Traffic Volumes

Table 2 presents daily traffic volumes on project area roadways. Weekday traffic on the freeways and major arterials within the project area consists primarily of commute traffic within the peak traffic periods (generally weekdays between the hours of 7:00 a.m. and 9:00 a.m., and 4:00 p.m. and 6:00 p.m.), and a mix of residential, commercial, and industrial traffic throughout the day. Daily traffic on roadways in the project vicinity is generally highest on roadways leading to and from I-680 and I-880. Total daily truck traffic along SR 84 in the project vicinity ranged from approximately 2.4 percent east of Mission Boulevard to approximately 12 percent west of I-680 (Caltrans, 2003).

TABLE 2
EXISTING DAILY TRAFFIC VOLUMES ON ROADWAYS
IN THE VICINITY OF THE PROPOSED PROJECT

Roadway	Location	Annual Average Daily Traffic (vpd)[a]
Interstate 880	at State Route 84	186,000
Interstate 680	at Paloma Road	125,000
State Route 84		
Niles Canyon Road	East of Mission Boulevard	23,700
	West of Palomares Road	16,100
	East of Palomares Road	15,600
	West of Pleasanton-Sunol Road	7,900
Paloma Road	West of Interstate 680	8,900
Mowry Avenue	between State Route 238 and Peralta	33,000
Peralta Boulevard	Boulevard	16,500
Thornton Avenue	West of Mowry Boulevard	38,000
	East of Interstate 880	
State Route 238 (Mission Boulevard)	North of Niles Canyon Road	32,000
	South of Niles Canyon Road	36,500

[a] vpd = vehicles per day

SOURCE: Caltrans, 2004.

Bikeways/Pedestrian Circulation

Bikeways are typically classified as Class I, Class II, or Class III facilities. Class I bikeways are bike paths with exclusive right-of-way for use by bicyclists and pedestrians, with minimal cross flow by motorized vehicles. Class II bikeways are bike lanes striped within the paved areas of roadways and established for the preferential use of bicycles. Class III bikeways are signed bike routes that allow bicycles to share streets or sidewalks with vehicles or pedestrians. In the project area, Mission Boulevard is a Class II bikeway south of SR 84, and a Class III bikeway north of SR 84. Although bicyclists frequent SR 84, it is not a designated bicycle facility.

There is very little pedestrian activity in the dam site vicinities, given the absence of pedestrian facilities (i.e., pedestrian walkways or crossings) and residential uses. The Alameda Creek Regional Trail near Mission Boulevard follows along Alameda Creek, but terminates near Old Canyon Road, east of Mission Boulevard.

Transit

The AC Transit service area includes Alameda and Western Contra Costa Counties. Service extends south to the city of Fremont and includes the urbanized portions of the coastal foothill range. No AC Transit routes travel along SR 84; however, a number of AC Transit routes provide service to other segments of SR 84 and/or SR 238 within the vicinity of the proposed project (including Routes 99, 213, 215, 217, 232, and 253). In addition, the Santa Clara Valley Transportation Authority (VTA) operates an extensive network of local bus routes, including four

routes (140, 141, 180, and 520) that extend along Mission Boulevard south of Stevenson Boulevard in Fremont.

Parking

On-street parking is prohibited along SR 84, although recreationalists use gravel pullouts to access Alameda Creek. Sunol Dam is located off of SR 84, and vehicles can park on the access road. There is a paved pullout area at Niles Dam, but parking is prohibited.

Impacts

Significance Criteria

The City of San Francisco has not formally adopted significance standards for transportation and circulation impacts, but generally considers that implementation of the proposed project would have a significant effect on transportation, circulation, and parking if it were to:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system;
- Interfere with existing transportation systems, causing substantial alterations to circulation patterns or major traffic hazards;
- Cause a substantial increase in transit demand which cannot be accommodated by existing or proposed transit capacity;
- Cause a substantial increase in parking demand which cannot be accommodated by existing parking facilities; or
- Degrade the quality of the pavement to unacceptable or hazardous conditions.

Methodology

This analysis relies upon published California Department of Transportation (Caltrans) data and a technical memorandum prepared by CHS Consulting Group (2003). The memorandum outlined the existing roadway network, project access points, and expected number of truck trips required to implement the project.[1]

Assessment of impacts involved evaluating the effects of proposed activities that could result from increases in traffic volumes, loss of parking areas, and potential safety effects associated with removal. Removal activities, including proposed manpower and equipment, location, and rate of debris extraction were used to conservatively determine the potential number of vehicles that could be required to implement the project.

[1] The CHS study, however, was prepared for the conceptual engineering report, which presumed that the proposed project would remove all of the sediment behind the dams; therefore, the number of truck trips in that report is several magnitudes larger than that proposed for the revised project.

Impact Analysis

Impacts related to short-term increased congestion generated by construction vehicles would be limited to the period needed to complete dam removal at the project sites (see Chapter III, Project Description); these impacts are discussed below. Other project-related activities, such as site restoration, are not discussed, because this section only addresses impacts related to the transportation and circulation significance criteria noted above.

Vehicle Trip Generation

The majority of traffic related to removal of the dams would include trucks hauling debris. At the Sunol Dam site, approximately 1,200 cubic yards (cy) of material would be removed. If 10-cy-capacity trucks were used, approximately 120 one-way truck trips would be generated. Given a three-month time frame, approximately one truck trip per day would exit from the site.

It is estimated that 800 cy of material would be removed from the Niles Dam site. If 10-cy-capacity trucks were used, approximately 80 one-way truck trips would be generated. Given a two-month time frame, the proposed project would generate about two truck trips per day.

Demolition traffic would also include trips by work crews, dam-removal equipment (e.g., the one-time delivery/removal of excavators and bulldozers on flatbed trucks), and for operation set-up. The typical crew size would be 15 people, plus City inspectors for each site. Construction worker trips traveling to and from each work site would be approximately 23 round-trips (46 one-way trips) per day, for a total of 46 round-trips (92 one-way trips) for both dams. The removal would occur in periodic activity peaks, requiring brief periods of considerable effort followed by longer periods of reduced activities.

The project-related truck traffic and dam removal equipment could cause delays for other vehicles. On SR 84, project traffic (mainly truck traffic) would travel at slower speeds, make turning-movements at the project access points, and increase the overall volume of vehicles, thus causing delays for other vehicles.

The Niles Dam access point would not have sufficient shoulder space to permit project vehicles to access the site without using one lane of SR 84. Therefore, the traffic flow in this area would need to be narrowed to one-way flag-controlled traffic, which would cause delays to through-moving vehicles. Project traffic could also cause temporary and intermittent delays to vehicles accessing adjacent land uses, such as the nursery at the Sunol Dam site. This impact would be reduced to a less-than-significant level with the incorporation of Mitigation Measure B-1.

Transit Demand, Parking, and Road Conditions

It is expected that each worker would drive alone to the staging area and therefore would not create a demand for transit services. There would be no transit impacts, and thus mitigation is not required. The project would create a temporary parking demand for dam removal workers, their vehicles, and equipment (for about 30 parking spaces). Given the size of the staging area at Sunol

Dam, adequate parking would be available for workers and dam removal equipment as demolition proceeds. This is a less than significant impact, and mitigation is not required.

The use of trucks to transport equipment and material to and from the project work sites could affect road conditions on the designated haul routes by increasing the rate of road wear. The degree to which this impact would occur depends on the design (pavement type and thickness) and existing condition of the road. State routes (e.g., SR 84) and major arterials are designed to accommodate a mix of vehicle types, including heavy trucks. Therefore, impacts are expected to be negligible on those roads. However, the edge of pavement at project access points may not have been constructed to support use by construction equipment. Although wear and tear at the edge of pavement would be a less-than-significant impact, an improvement measure is recommended to further reduce this impact (see Chapter V, Mitigation Measures, under Transportation, Circulation, and Parking).

Traffic Safety Impacts

Project-related trucks would share area roadways with other vehicles. The use of SR 84, a high-volume and high-speed roadway, to access the sites could increase traffic safety hazards because of the need for slow-moving trucks and dam removal equipment to merge into traffic from project access points. Potential conflicts could also occur between truck traffic and bicyclists. The volume, speed, and curvature of the road present safety concerns for motorists and bicyclists approaching project access points at both sites.

Furthermore, blasting could startle users of SR 84. This impact would be reduced to a less-than-significant level with the incorporation of Mitigation Measure B-1, which includes the installation of advance warning signs if blasting is used. Traffic could be stopped temporarily when blasting occurs.

Sunol Dam Site Access

The intersection of the nursery's driveway and SR 84 presents some sight-distance concerns for large trucks turning left onto SR 84 because of the length of the uncontrolled section of SR 84, the high volume of traffic during peak hours, and the downward slope and northward curve of SR 84 to the west of the nursery driveway.

Niles Dam Site Access

Access to the Niles Dam site, provided via a proposed access point along SR 84, would require narrowing the traffic flow to one-way flag-controlled traffic. Warning signs indicating a stop ahead and one-way flag control should be placed well in advance of the driveway because of the limited sight distance near the project access point. This impact would be reduced to a less-than-significant level with the incorporation of Mitigation Measure B-1.

References

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Santa Clara Valley Transportation Authority website, www.vta.org, accessed December 2004.

C. Utilities and Public Services

Setting

This section discusses existing utilities and public services within the project area and vicinity, presents the regulatory framework, and provides an analysis of impacts to these facilities and services that could result from partial removal of Sunol and Niles Dams.

Water Supply and Sewerage Systems

The Alameda County Water District (ACWD) supplies water to southern Alameda County, including water users in the vicinity of the project area (ACWD, 2004). An average of 49.02 million gallons per day (mgd) of water is supplied to ACWD customers. The ACWD obtains water from three sources: the State Water Project (SWP), the SFPUC Hetch Hetchy System, and Alameda Creek watershed runoff. Two facilities for water treatment, the Mission San Jose Water Treatment Plant and Water Treatment Plant Number Two, are maintained by ACWD. The plants have a combined treatment capacity of 9.5 mgd.

The unincorporated area of Alameda County where the proposed project is located is not serviced by a wastewater treatment system. Surrounding properties rely on onsite septic systems for wastewater treatment.

Stormwater and Flood Control

Zone 7 Water Agency is responsible for maintaining and improving flood control channels and streams in the East County area[1] (ESA, 2004). Zone 7's jurisdiction includes the portion of the Alameda Creek watershed where the proposed project is located. This stretch of the creek, however, is not included in Zone 7's *Stream Management Master Plan*. Maintenance along this portion of the creek is infrequent. Extensive widening and straightening of arroyo channels in the Livermore Valley area have significantly reduced flood hazards for low-magnitude events, although some portions of Zone 7's area remain within flood-prone zones for large events.

The Alameda County Flood Control and Water Conservation District (ACFCWCD) maintains the Alameda Creek flood control channel, which begins where Mission Boulevard crosses over Alameda Creek, downstream of Niles Dam (see Figure 4). The ACFCWCD maintains the design capacity of the flood control channel by periodically removing sediment and vegetation.

Pacific Gas & Electric Facilities

Electricity is provided to Alameda County by Western, the Pacific Gas and Electric Company (PG&E), and Northern California Power Agency. The East County area is traversed by several aboveground 69-, 115-, 230-, and 500-kilovolt (kV) electric transmission lines. Two of the

[1] The East County area encompasses 418 square miles of eastern Alameda County and includes the cities of Dublin, Livermore, Pleasanton, and a portion of Hayward as well as surrounding unincorporated areas.

county's three major substations, Tesla and Tracy, are located in East County. These substations are the distribution points for various line and voltages. The East County area also contains 11 of the county's 69-kV substations (ESA, 2004).

Solid Waste Facilities

The 2,170-acre Altamont Sanitary Landfill and the 644-acre Vasco Road Sanitary Landfill, located in northeastern Alameda County, handle most of the county's solid waste. The Tri-City Recycling and Disposal Facility in Fremont is the county's only other active landfill. The Altamont facility is located east of Dyer Canal and north of Altamont Pass Road, northeast of the city of Livermore. Some of the sediment behind the dams would be off-hauled to area landfills as part of dam removal activities.

Emergency Service Providers

The Alameda County Sheriff's Department provides police protection in unincorporated Alameda County, where the Sunol Dam site is located. All emergency vehicles (fire and police vehicles, and ambulances) are dispatched from the Sheriff Department's central switchboard. The nearest Sheriff's station to Sunol Dam is the San Leandro Eden Township Substation, 15 miles to the west (Alameda County Sheriff's Office, 2004). If an urgent call occurs and the Sheriff's Department officer is an extended distance from the emergency, the California Highway Patrol or police from the cities of Livermore or Pleasanton would then respond under mutual-aid agreements. Fire protection in the unincorporated area of Alameda County is provided through a contract with the California Division of Forestry (CDF), based at Alameda County Fire Department (ACFD) Station 14 in Sunol, a station owned by CDF. For major disasters, the ACFD is part of a larger countywide mutual-aid system.

Alameda County Emergency Services (ACES) oversees emergency medical services throughout the portion of Alameda County where the proposed project is located. While ACES does not provide the service directly, it organizes and contracts its services to ensure that all jurisdictions are served according to approved standards. ACES contracts with numerous ambulance companies and ensures that emergency units respond to 90 percent of calls within eight minutes. ACES also provides fire districts with basic life-support training and equipment. While basic emergency service provided by the fire department must arrive within five minutes, ambulance paramedics generally arrive up to three minutes later (Alameda County, 2002).

Police service for the Niles Dam site is provided by the City of Fremont Police Department, located at 2000 Stevenson Boulevard in Fremont (City of Fremont Police Department, 2005). Fire protection and emergency medical services are provided by the City of Fremont Fire Department (City of Fremont, 2005). The closest station to the dam site is located at 39609 Stevenson Place.

Recreation (Swimming Facilities)

There is one year-round swimming center and four seasonal swimming pools in Hayward. The Hayward Plunge at 24176 Mission Street is operated year-round by the Hayward Area Recreation

and Parks District Aquatics Program (City of Fremont Parks and Recreation Department, 2005). Hayward State has two pools open to the public. The City of Fremont Parks and Recreation Department holds recreational swimming activities at 42400 Blacow Road in Fremont and at 37400 Cedar Boulevard in Newark (City of Fremont Parks and Recreation Department, 2005).

Impacts

The Initial Study published for this project (see Appendix A, p. 1) described the proposed project as having two options for sediment removal: either the sediment would be left in place or would be off-hauled, except for the quantity of sediment needed to fill in the plunge pools downstream of each dam. The notice of preparation (NOP) stated that the "EIR will evaluate the environmental effects of both sediment management options as part of the project" (see Appendix A, p. 25). Since publication of the NOP, the SFPUC modified the project description (see Chapter III, Project Description) so that sediment is to be left in place, except for that amount necessary to fill the plunge pools and any incidental amount to be off-hauled during the course of removing the dams. The environmental effects of leaving the sediment in place are addressed in Section IV.F, Hydrology, Groundwater, and Water Quality, of this chapter.

Significance Criteria

The City of San Francisco has not formally adopted significance standards for impacts related to public services and utilities, but generally considers that implementation of the proposed project would have a significant impact on public services and utilities if it were to:

- Breach published, national, state, or local standards relating to solid waste;
- Substantially increase demand for recreation; or
- Require major expansion of power, water, or communications facilities.

Impact Analysis

An estimated 1,200 cubic yards (cy) of concrete from Sunol Dam and 800 cy of concrete from Niles Dam, some sediment, vegetation from clearing and grubbing activities, and associated trash would be removed from the dam sites.[2] The quality of sediment to be disposed could be an issue in determining an appropriate disposal facility. Based on the laboratory results and communications with the ACFCWCD and Zone 7 regarding dredging of Alameda Creek and Arroyo de la Laguna, the sediments impounded behind Sunol and Niles Dams are likely free of potentially hazardous substances, or have concentrations well below regulatory limits for disposal. The results of preliminary testing of the sediment impounded behind the two dams indicate that it would be of high enough quality for reuse as gravel. Since full core samples were not obtained, the potential remains that hazardous substances could be present. This impact is potentially significant but mitigable.

[2] Traffic impacts associated with off-hauling concrete is addressed in Section IV.B, Transportation, Circulation, and Parking.

There are three solid waste facilities within Alameda County where concrete, sediment, vegetative debris, and trash can be disposed. The facilities have sufficient capacity to take the debris from the project sites. The solid waste associated with the proposed project would not substantially affect the foreseeable life of any of the landfills. The disposal of concrete, sediment, vegetative debris, and trash is a one-time only event, ending upon completion of the project. This is a less-than-significant impact that does not require mitigation.

Unsanctioned swimming occurs at both of the dams, which is partly the reason for formulation of Project Objective #2. Removing the dams and filling in the plunge pools would decrease the attractiveness of these sites for recreational use. The proposed project would not increase demand for recreational facilities because it does not involve the construction of housing or employment centers.

The proposed project has the potential to affect downstream water supplies and flood control operations. These impacts are discussed in Section IV.F, Hydrology, Groundwater, and Water Quality.

The proposed project would not require the expansion of power or communication facilities, as it involves the removal of dams and not the construction of facilities that use energy or require communications.

References

Alameda County, *East County Area Plan*, Adopted: May 1994, Corrected: March 1996, Amended: September 1996, July 1998, and November 2000, Adopted: May 2002.

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Alameda County Water District, *ACWD Fact Sheet.* Available online at http://www.acwd.org/acwd-factsheet.html, accessed December 6, 2004.

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ESA, *South Bay Aqueduct Improvement and Enlargement Project EIR,* December 2004.

Hayward Area Parks and Recreation Program website. Available online at http://www.hard.dst.ca.us/, accessed July 21, 2005.

D. Biological Resources

Setting

This section identifies the plant communities, wildlife habitats, and sensitive species occurring in the project area and identifies potential project-related impacts to these resources. As described in this section, the project area encompasses habitats adjacent to and within the dam removal footprint. Specific worksites include Sunol Dam and Niles Dam, primary access routes to instream worksites, and equipment staging areas. Project-related impacts could be direct, indirect, and/or cumulative. The local context for the proposed project is Alameda Creek in Niles Canyon; the regional context for the proposed project is the greater Alameda Creek watershed.

The findings of this section are based on technical research, conducted by both public and private organizations, that characterizes the biological resources of Alameda Creek and assesses both the feasibility and potential impacts of dam removal. ESA conducted initial biological surveys throughout the project area. ESA biologists surveyed the project site on March 1 and April 17, 2002 to identify plant communities, wildlife habitats, and habitat for sensitive species. Based on survey results, biologists from the SFPUC conducted snorkeling and electrofishing surveys and protocol-level surveys for California red-legged frog (*Rana aurora draytonii*) upstream and downstream of the two dams. The fish fauna surveys were conducted on August 7, 8, 13, and 14, 2002. Daytime California red-legged frog surveys were conducted on July 15 and 17, 2002 at Sunol Dam and July 16 and 17, 2002 at Niles Dam. Evening surveys were conducted on July 18 and 23, 2002 at Sunol and July 22 and 24, 2002 at Niles Dam. A preliminary mapping of wetland vegetation was conducted in April 2002 by ESA biologists. In October 2003, ESA biologists conducted a delineation of wetlands and other waters of the United States at Sunol and Niles Dams. The wetland delineation was verified by the U.S. Army Corps of Engineers (Corps) on November 1, 2004. Surveys for large flowered fiddleneck (*Amsinkia grandiflora*) were conducted by plant ecologist Barbara Leitner on May 26, 2005.

A primary objective of the proposed project is to remove barriers to anadromous fish access to the upper Alameda Creek watershed by restoring the original riverine character of the creek.

Regional Setting

The Alameda Creek watershed encompasses approximately 633 square miles and flows from its headwaters at Oak Ridge south to South San Francisco Bay. Alameda Creek, in the project area, is a broad, deep stream with a varied combination of riffles, pools, and runs. The proposed project is located in eastern Alameda County within the California Floristic Province. Alameda County has a Mediterranean climate; within the Tri-Valley area and adjacent hills, the vegetation is a mosaic of oak woodland, annual grasslands, upland scrubs, wetland communities, and riparian scrubs and forests. At higher elevations, foothill oak woodland, annual grasslands, and riparian vegetation dominate the landscape.

Local Setting

Sunol and Niles Dams are located on Alameda Creek in the Niles Canyon area of the larger Alameda Creek watershed (see Figures 1 and 2). The project area contains vegetation communities and wildlife habitats for common and special-status species. Plant communities and the corresponding habitats are discussed below.

Vegetation and Wildlife Habitats

The plant community descriptions and terminology used in this analysis are based on *A Manual of California Flora* (Sawyer and Keeler-Wolf, 1995) and *Preliminary Description of Terrestrial Natural Communities of California* (Holland, 1986). Vegetation series generally correlate with wildlife habitat types and were classified and evaluated using the California Department of Fish and Game's (CDFG) *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer, 1988). Based on this terminology, the project area supports eight different plant communities: mixed riparian forest, willow riparian scrub, sycamore riparian woodland, coast live oak forest, Diablan sage scrub, annual grassland, freshwater emergent marsh, and freshwater emergent seep. The corresponding wildlife habitat types are provided in Table 3.

TABLE 3
PLANT COMMUNITIES AND CORRESPONDING WILDLIFE HABITATS

Plant Community	Corresponding CWHR[a] Habitat
Mixed Riparian Forest	Valley Foothill Riparian
Willow Riparian Scrub	Valley Foothill Riparian
Sycamore Riparian Woodland	Valley Foothill Riparian
Coast Live Oak Forest	Coastal Oak Woodland
Diablan Sage Scrub	Coastal Scrub
Annual Grassland	Annual Grass
Freshwater Emergent Marsh	Fresh Emergent Wetland
Freshwater Emergent Seep	Fresh Emergent Wetland
No Corresponding Plant Community	Riverine

[a] CWHR refers to California Wildlife Habitat Relationships

SOURCES: ESA; Holland, 1986; Mayer and Laudenslayer, 1988

Mixed Riparian Forest

Mixed riparian forest is the predominant vegetation occurring at the margins of Alameda Creek. This vegetation is most extensive upstream of Sunol Dam, where it occupies the first terrace from the edge of the creek (i.e., ordinary high water) to approximately 6 to 8 feet above ordinary high water. It is dominated by various species of willows, including arroyo willow (*Salix lasiolepis*), red willow (*S. laevigata*), and black willow (*S. goodingii*), in association with several other riparian trees, such as alder (*Alnus rhombifolia*), California black walnut (*Juglans californica*), big-leaf maple (*Acer macrophyllum*), and buckeye (*Aesculus californicus*). A substantial stand of

black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) also forms a major component of this community. These 80- to 100-foot-tall trees exceed the lower continuous canopy, adding a layer of habitat structure that is not often part of riparian habitats in the region. Below the tree canopy, a relatively dense stratum of shrubs and sapling trees forms a third layer of structure consisting of California blackberry (*Rubus ursinus*), mulefat (*Baccharis salicifolia*), California wild rose (*Rosa californica*), sedge rush (*Juncus* spp.), and western sword fern (*Polystichum munitum*). This community supports very little herbaceous understory due to low light conditions at the soil surface, which suppress seed germination. This early seral community may succeed to any of several riparian woodland or forest types in the absence of flooding disturbance.

Willow Riparian Scrub

Willow riparian scrub consists of dense, nearly impenetrable stands of willows and many of the same woody species found in willow riparian forest. This vegetation occupies the immediate shoreline of Alameda Creek in many locations, but is most extensive on the broad gravel bar downstream of Sunol Dam. Willow riparian scrub occupies areas along the creek that are frequently disturbed by high flows and subsequent reconfiguration of the channel bed and banks, which often precludes the development of mature trees and greater structural complexity in the canopy.

Sycamore Riparian Woodland

Sycamore riparian woodland occupies a narrow band along the banks of Alameda Creek, particularly in the reach upstream of Niles Dam. It is dominated by large California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), willow (*Salix* spp.), white alder, big-leaf maple, and California black walnut. The understory consists of a mix of riparian shrubs, such as mulefat and California blackberry, with non-native grasses and primarily non-native herbaceous species, including ripgut brome (*Bromus diandrus*), bur clover (*Medicago polymorpha*), stinging nettle (*Urtica dioica* ssp. *holoserica*), white sweetclover (*Melilotus alba*), wild radish (*Raphanus sativus*), and vetch (*Vicia* sp.).

Habitat Attributes

Riparian woodland habitats (including mixed riparian, willow riparian scrub, and sycamore riparian woodland) provide food, water, migration and dispersal corridors, breeding sites, and thermal cover for wildlife and can support many resident and migratory wildlife species (CDFG, 1999). Wooded stream edges serve as nesting sites and provide escape habitat for many species. Foliage, bark, and ground substrates provide a variety of foraging areas. Birds that forage for insects in riparian areas include Bewick's wren (*Thryomanes bewickii*), black phoebe (*Sayornis nigricans*), and black-headed grosbeak (*Pheuticus melanocephalus*). Bark-insect foraging birds also occur in this habitat and include acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttalli*), and white-breasted nuthatch (*Sitta canadensis*). Other bird species typically observed in riparian woodland habitats include dark-eyed junco (*Junco hyemalis*), bushtit (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*), chestnut-backed chickadee (*Poecile rufescens*), and brown creeper (*Certhia americana*). Riparian woodland areas

also support piscivorous birds such as the belted kingfisher (*Ceryle alcyon*). Several individuals of this species were observed foraging in Alameda Creek during field surveys in April 2002.

Riparian woodlands also provide habitat for reptiles and amphibians, including the western toad (*Bufo boreas*), California newt (*Taricha torosa*), Pacific tree frog (*Hyla regilla*), and Pacific slender salamander (*Batrachoseps attenuatus*). Mammals such as the western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), western gray squirrel (*Sciurus griseus*), Virginia opossum (*Didelphis marsupialis*), and raccoon (*Procyon lotor*) utilize these habits for nesting and foraging. Small rodents attract raptors such as red-shouldered hawk (*Buteo lineatus*) and red-tailed hawk (*Buteo jamaicensis*). Blacktailed deer (*Odocoileus hemionus columbianus*) and striped skunk (*Mephitis mephitis*) were observed during reconnaissance-level field surveys in April 2002.

Coast Live Oak Forest

Coast live oak *(Quercus agrifolia*) is the dominant canopy tree of the upland forested area at both dam sites. On the steep north-facing slope at Sunol Dam, coast live oak and California bay (*Umbellularia californica*) form a continuous forest with complete canopy coverage. These two trees also constitute the forest cover on the north bank, where they occupy the relatively level second terrace, which is slightly higher in elevation than the willow riparian forest and scrub. California black walnut occurs frequently throughout this vegetation, but is also present in localized dense stands. Other trees that occur occasionally are valley oak *(Quercus lobata)* and California buckeye. The understory is typically sparse in the deep shade of the evergreen trees and consists of sedge (*Carex* sp.), bedstraw (*Galium aparine*), snowberry (*Symphoricarpos mollis*), and localized dense meadows of creeping rye (*Leymus triticoides*). Where more light penetrates the canopy, the understory includes more non-native grasses and herbs, such as periwinkle (*Vinca major*), Fuller's teasel (*Dipsacus fullonum*), ripgut brome, Italian thistle *(Carduus pycnocephalus)*, and miner's lettuce *(Montia perfoliata)*. Numerous saplings and seedlings of the canopy trees are present in the understory. Near the upstream limit of the project area (approximately 2,000 feet from Sunol Dam), an extensive network of California grape vines (*Vitis californica*) is supported by the tree canopy.

At Niles Dam, the oak-bay forest also dominates the upper terrace between the riparian vegetation at creekside and the railroad, and continues upslope. The habitat structure is less complex, with only the tree and understory layers present (i.e., no trees extend above the dominant canopy and fewer shrubs below it), and the understory is less diverse and is represented by a higher proportion of non-native weedy species.

Habitat Attributes

Coast live oak forest in the project area supports many of the same species as described above for riparian woodland habitat. Coast live oak forests support an abundance of birds, reptiles, and amphibian species.

Diablan Sage Scrub

This vegetation type occurs on south-facing slopes opposite Niles Dam, where temperatures are higher and soil conditions are shallow and dry. The vegetation consists of dense to moderately open shrub canopy with a sparse herbaceous understory. California sagebrush (*Artemisia californica*) is the dominant species; associated species include coyote brush (*Baccharis pilularis*), bush monkeyflower (*Mimulus aurantiacus*), poison oak (*Toxicodenron diversilobum*), deer weed (*Lotus scoparius*), and golden yarrow (*Eriophyllum confertiflorum* var. *confertiflorum*). Non-native annual grasses form the majority of vegetation between shrubs, although there also is a high diversity of native wildflowers, low shrubs, and perennial grasses, including blazing star (*Mentzelia lindleyi*), globe lily (*Calochortus amabilis*), Douglas iris (*Iris douglasiana*), blue dicks (*Dichelostemma capitatu*), bee plant (*Scrophularia californica*), paintbrush (*Castilleja affinis*), buckwheat (*Eriogonum latifolium*), California fuschia (*Epilobium canum* ssp. *canum*), purple needlegrass (*Nassella pulchra*), and melic grass (*Melica imperfecta*).

Habitat Attributes

Scrub habitats provide cover for a variety of common mammal species, such as western harvest mouse, broad-footed mole (*Scapanus latimanus*), Botta's pocket gopher (*Thomomys bottae*), and deer mice, and provide foraging habitat for blacktailed deer and nesting and foraging habitat for California ground squirrel (*Spermophilus beecheyi*), raccoon, and striped skunk. Reptile species common to this community are common kingsnake (*Lampropeltis getulus*) and gopher snake (*Pituophis melanoleuscus*).

Annual Grassland

Non-native annual grasslands are distributed throughout the valleys and foothills of most of California. Within the project area, annual grasslands form a dense to sparse cover of non-native grasses associated with numerous other annual and perennial herbaceous plants. These grasslands typically occur on deeper soils in the gaps between oak and riparian forests, and also form the understory of several other plant communities. The plant species in grasslands respond favorably to moderate disturbance, such as grazing, which may have played a role in their widespread establishment. Near Niles Dam, annual grassland is nearly continuous as the understory of coast live oak forest, and corresponds to a lack of habitat structure and diversity in this community that may have resulted from grazing or other historical disturbance. In contrast, annual grassland near Sunol Dam is relegated to the outside (i.e., away from the creek) edge of the forest canopy. The understory here is composed mainly of native grass, sedge, or shrubs, which may be attributable to less recent grazing or other historical disturbance.

Plant species in this community include numerous common non-native grasses, slender oats (*Avena barbata*), soft chess (*Bromus hordaceus*), ripgut brome, and foxtail barley (*Hordeum murinum* ssp. *leporinum*). A mix of native and non-native species are found, including black mustard (*Brassica nigra*), wild radish *(Raphanus sativus)*, Italian thistle (*Carduus pycnocephalus*), California poppy (*Eschscholzia californica*), California buttercup (*Ranunculus californica*), filaree (*Erodium cicutarium*), and dove lupine (*Lupinus bicolor*).

Habitat Attributes

Annual grasslands in general support a small diversity of wildlife, but the adjacent riparian and oak woodland communities greatly enhance the wildlife habitat elements of the grassland in the project area. The habitats adjacent to the grasslands in the project area provide breeding, nesting, and refugia for species using the grassland habitat. Amphibians in this community include western toad, Pacific tree frog, and California slender salamander. Reptiles typically found in grassland habitats include western fence lizard (*Sceloporus occidentals*), western skink (*Eumeces skiltonianus*), gopher snake, and western rattlesnake (*Crotalus viridus*). Common birds that use grasslands for nesting and foraging materials include western meadowlark (*Sturnella neglecta*), red-winged blackbird (*Agelaius phoeniceus*), and song sparrow (*Melospiza melodia*).

Freshwater Marsh

Within the project area, freshwater marshes occur in many locations with slow moving and shallow water or perennially saturated soils. Freshwater marshes are typically dominated by perennial emergent monocots and other plants that tolerate inundation or prolonged wet conditions. In the project area, marshes are not extensive due to the topographic conditions (i.e., limited opportunities for low-lying habitat near the ordinary flow line of the creek). Locations or conditions that support freshwater marsh include:

- Small patches of cattails (*Typha* spp.) and tule (*Scirpus* sp.) within the inundation area behind Sunol Dam
- A narrow, discontinuous band of cattails, tules, and sedge along the creek bank, and a wider band mixed with willow and mulefat between the creek and highway retaining wall near Niles Dam
- Gravel bars supporting a sparse cover of perennial wetland plants (cattails, tule, and mulefat) and annual wetland plants (willow herb, cocklebur, mint, and mugwort)

Freshwater Seep

Freshwater seeps occur in several locations on the banks of Alameda Creek both upstream and downstream of Sunol Dam. The seeps discharge water slowly, maintaining small localized areas of year-round saturated soil. Vegetation is limited to plant species that are adapted to high soil moisture, such as sedge (*Carex* sp.), cattail, watercress (*Rorippa nasturtium-aquatica*), and bulrush (*Scirpus* sp.). Downstream of Sunol Dam, water discharges at several locations for nearly 200 feet along the base of the railroad berm, forming a nearly continuous seep within the willow scrub canopy. Several other small seeps drain the oak forest terrace, discharging directly to Alameda Creek.

Habitat Attributes

The freshwater marsh and freshwater seep habitats are contiguous with the riparian habitat and support many of the same wildlife species as described previously. The emergent wetland vegetation within the project area is confined to narrow fringe along the banks of Alameda Creek.

Species that have been observed (April 2002) foraging or seeking refugia within these areas include wood duck (*Dumetella carolinensis*), black phoebe, and Pacific tree frog.

Aquatic Habitat

Alameda Creek

Alameda Creek flows from its headwaters at Oak Ridge to South San Francisco Bay. The creek has historically been divided into three distinct reaches: upper Alameda Creek, Niles Canyon reach (see Figure 1), and lower Alameda Creek. The project is located within the Niles Canyon reach that is confined by steep upland habitat and paralleled by a major highway (SR 84) and an active railroad route. Within the project reach, Alameda Creek is characterized by long runs and glides and relatively short, shallow riffles (Buchan et al., 1999). Substrate ranges from silt and sand with small cobbles to gravel and larger boulders downstream of Niles Dam. Water temperatures in Alameda Creek have been shown to vary widely in Niles Canyon, with average daily temperatures generally peaking in late August in the 20- to 30-degree Celsius range (68 to 86 degrees Fahrenheit), and daily temperature fluctuations ranging between 1 and 11 degrees Celsius, depending on geographic location and the degree of riparian shading (Trihey & Associates, 2001).

Prior to the development of water conveyance facilities, such as reservoirs and diversions, Alameda Creek, in Niles Canyon, was likely an intermittent to perennial stream characterized by low flows during late summer and fall (Buchan et al., 1999). Aquatic habitats within Niles Canyon likely functioned as a migratory corridor for anadromous fishes such as steelhead, lampreys, and probably salmon (Buchan et al., 1999). However, construction and operation of fish migration barriers, such as the Calaveras and Turner Dams, have prevented anadromous fishes migrating through Niles Canyon from reaching high-quality, cold water habitat (Buchan et al., 1999). Reduced flows from the reservoirs have also decreased successful smolt migration out to San Francisco Bay. Finally, ACWD augments summer flows, particularly summer releases from the South Bay Aqueduct into Niles Canyon. As a result, summer base flows in Niles Canyon have become less variable, thereby increasing pool temperatures and reducing rearing habitat (Buchan et al., 1999). However, although the stream temperatures within the reach are probably higher than pre-development flows, augmented flows potentially provide atypical fast-water habitat that may allow trout to obtain sufficient food to withstand warmer temperatures (Gunther et al., 2000).

Thirteen native fish species have been collected in nontidal portions of Alameda Creek during the past century (Gunther et al., 2000). Many of the species observed in the creek are typical of those found in streams in the region, including California roach (*Hesperoleucus symmetricus*), Sacramento sucker (*Catostomus occidentalis*), Sacramento pikeminnow [formally known as squawfish] (*Ptychocheilus grandis*), steelhead (*O. mykiss*), Pacific lamprey (*Lampetra tridentata*), and prickly sculpin (*Cottus asper*). Historically, Alameda Creek may have supported populations of Chinook salmon (*Oncorhynchus tshawytscha*) (Gunther et al., 2000). In recent years, small numbers of Chinook salmon adults have been recovered in the Alameda County Flood Control and Water Conservation District's (ACFCWCD) flood control channel (see

Figure 4), as well as in other streams not previously known to support salmon runs (Gunther et al., 2000).

In November 2002, the SFPUC conducted snorkel, seine, and electrofishing surveys within the project area. Twelve fish species were found. California roach, Sacramento pikeminnow, and Sacramento sucker accounted for 93 percent of the fish collected during seine and electrofishing surveys. The next most abundant species were largemouth bass and hitch (*Lavinia exilicauda*). Three Pacific lamprey ammocoetes were collected above Niles Dam. Resident rainbow trout were not collected or observed. According to Gunther et al. (2000), introduced species have increased in abundance and distribution throughout the watershed in the past decades.

Wetlands

Generally, wetlands are lands where saturation with water is the dominant factor in determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin et al., 1979). Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. Jurisdictional wetlands occurring within the project area are summarized in Table 4.

TABLE 4
JURISDICTIONAL WATERS WITHIN PROJECT AREA

	Square Feet	Acres
Sunol Dam Project Area		
Freshwater Marsh	9,506	0.22
Freshwater Seep	3,833	0.09
Willow Riparian Scrub	19,998	0.45
Mixed Riparian Forest	25,557	0.59
Gravel Bars	31,234	0.72
Total Wetlands	90,128	2.07
Other Waters of the U.S. (Alameda Creek)	205,700	4.72
Sunol Dam Jurisdictional Waters Total	*295,828*	*6.79*
Niles Dam Project Area		
Freshwater Marsh	2,546	.06
Willow Riparian Scrub	18,637	0.43
Mixed Riparian Forest	1,016	0.02
Seasonal Freshwater Wetland	222	0.01
Total Wetlands	22,420	0.52
Other Waters of the U.S. (Alameda Creek)	28,050	0.64
Niles Dam Jurisdictional Waters Total	*50,471*	*1.16*
Total Jurisdictional Waters	**346,299**	**7.95**

SOURCE: ESA, 2003

Clean Water Act Sections 404 and 401

Wetlands are a subset of waters of the United States and receive protection under Sections 404 and 401 of the Clean Water Act (CWA). The term "waters of the United States," as defined in the Code of Federal Regulations (33 CFR 328.3[a] and [b]; 40 CFR 230.3[s]), applies to those areas

that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands falling under Corps jurisdiction must demonstrate the presence of three specific wetland parameters: hydric soils, hydrophytic vegetation, and sufficient wetland hydrology. Generally, wetlands include swamps, marshes, bogs, and similar areas.

Lakes, rivers, and streams are defined as "other waters" under Section 404 and 401 of the CWA. Jurisdictional limits of these features are typically noted by the ordinary high water mark (OHWM). The OHWM is the line on the shore or bank that is established by the fluctuations of water and is indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in soils, lack of woody or terrestrial vegetation, and the presence of litter or debris (33 CFR 328.3).

Other Wetland Definitions

While the Corps definition of wetlands is most commonly used for regulatory purposes, definitions adopted by other state and federal agencies may also apply. The U.S. Fish and Wildlife Service (USFWS) and CDFG have adopted the Cowardin et al. (1979) definition of wetlands. The Corps definition of wetlands requires three wetland identification parameters, whereas the Cowardin definition requires the presence of two parameters. For this reason, identification of wetlands by CDFG consists of the union of all areas that are periodically inundated or saturated, or in which at least seasonal dominance by hydrophytes may be documented, or in which hydric soils are present. The CDFG does not normally assert jurisdiction over wetlands unless they are subject to a Lake or Streambed Alteration Agreement (California Fish and Game Code 1600–1616) or they support state-listed endangered species.

Special-Status Species

Certain plant and animal species are considered "special-status" species by federal and/or state resource agencies because of their recognized rarity or vulnerability to various causes of habitat loss or population decline. Some of these species receive specific protection from federal or state endangered species legislation. Other species have been designated as "sensitive" on the basis of the following: adopted policies and expertise of state resource agencies or organizations with acknowledged expertise; or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives. These species are referred to collectively as "special-status species" in this EIR, following a convention that has developed in practice but has no official sanction. Special-status species are discussed further in the Regulatory Framework section, below.

A list of special-status plant and animal species that could occur in the vicinity of the project was compiled on the basis of data in the California Natural Diversity Database (CNDDB) (CNDDB, 2003), consultation with the CDFG, California Native Plant Society (CNPS) literature (Skinner and Pavlik, 2001), consultation with the USFWS, and biological literature for the region. Tables 5

and 6 summarize the special-status plant and animal species, respectively, which are known to either occur or have the potential to occur near the proposed project.

Special-Status Plants

Large-Flowered Fiddleneck (*Amsinkia grandiflora*). This federally and state-listed endangered species occurs only in three extant natural populations, the nearest at Lawrence Livermore Laboratory. The preferred habitat appears to be north- to northwest-facing slopes, usually with a substantial native perennial grass component to the vegetation. No areas surveyed in April 2002 by ESA botanists met these habitat criteria, and no individual plants were observed. There is a low potential for the species to occur in canopy gaps that may exist in the north-facing forested slope near Sunol Dam, which was not surveyed. Surveys conducted in May 2005 (Leitner, 2005) did not reveal suitable habitat for this species. No individuals from the family *Amsinkia* were observed during appropriately timed botanical surveys (Leitner, 2005).

Showy Indian Clover (*Trifolium amoenum*). This federally listed endangered and CNPS List 1B species is currently known from only two occurrences in Marin and Sonoma Counties, but new populations are being sought because of its recent rediscovery after being believed extinct. Marginal habitat occurs within the project area, consisting of moist swales in grasslands. It is also reported as occurring on serpentine soils, which are not present in the project area. The species flowers between April and June, and none were observed during ESA's survey in April 2002.

Big Tarplant (*Blepharizonia plumosa* ssp. *plumosa*). This federal species of concern and CNPS List 1B plant typically occurs on thin, rocky, or sometimes subalkaline soils. Annual grasslands and coastal scrub in the project area provide suitable habitat. New populations of this species have been recently identified within the Livermore Valley and elsewhere in Contra Costa County; therefore, it remains possible for the species to occur in areas not recently surveyed. Characteristic of many tarplants, flowering occurs in summer, between July and October. Therefore, the species would not have been evident during ESA's survey in April 2002.

Santa Clara Red Ribbons (*Clarkia concinna* ssp. *automix*). This federal species of concern and CNPS List 1B annual plant is usually found in mixed evergreen forest, woodlands, and coastal scrub in the Hamilton Range and Santa Cruz Mountains, although one occurrence is documented in the vicinity of the town of Sunol (CNPS, 2003). The species flowers from April through May, and individuals would have been evident in woodland areas that were surveyed by ESA botanists in April 2002. North-facing woodland slopes near Sunol Dam and coastal scrub near Niles Dam, however, were not surveyed.

Western Leatherwood (*Dirca occidentalis*). This CNPS List 1B species is a deciduous shrub that occurs in shady woodlands, riparian forests and, less often, in mesic chaparral or scrub. Although it flowers early (January though April), it would have been evident in the areas that were surveyed by ESA in April 2002, and none were observed. Areas not surveyed, particularly the north-facing, forested slope near Sunol Dam, also provide suitable habitat.

TABLE 5
SENSITIVE PLANT SPECIES KNOWN TO OCCUR OR THAT COULD POTENTIALLY OCCUR IN THE PROJECT AREA

Common Name *Scientific Name*	Listing Status USFWS/ CDFG/CNPS[a]	Habitat	County Distribution[b]	Flowering Period	Suitable Habitat Present in Project Area?
Large-flowered fiddleneck *Amsinkia grandiflora*	FE/CE/1B	Steep north- to northwest-facing slopes with annual or perennial grassland associated species.	ALA, CCA, SJQ	April–May	Yes
Showy Indian clover *Trifolium amoenum*	FE/--/1B	Wet swales in grasslands, often on serpentine soil.	ALA, MEN, MRN, NAP, SCL, SOL, SON	Februrary–April	Yes
Big tarplant *Blepharizonia plumosa* ssp. *plumosa*	FSC/--/1B	Annual grasslands, often in thin or subalkaline soils.	ALA, CCA, SJQ, STA, SOL	July–October	Yes
Santa Clara red ribbons *Clarkia concinna* ssp. *automixa*	FSC/--/1B	Upland woodlands, chaparral, and coastal scrub.	ALA, SCL	May–July	Yes
Western leatherwood *Dirca occidentalis*	--/--1B	Shady upland or riparian woodland forest, less often in chaparral or scrub. Perennial deciduous shrub.	ALA, CCA, MRN, SCL, SMT, SON	January–April	Yes
Diablo helianthella *Helinathella castanea*	FSC/--/1B	Woodland grassland and scrub.	ALA, CCA, MRN, SFO, SMT	April–June	Yes
Most beautiful jewel-flower *Streptanthus albidus* ssp. *peramoenus*	FSC/--/1B	Chaparral and valley foothill grasslands. Cismontane woodlands.	ALA, CCA, SCL	April–June	No

[a] Listing status codes are as follows:
USFWS=U.S. Fish and Wildlife Service
FE=Listed as Endangered by the Federal Government
FT=Listed as Threatened by the Federal Government
FPE=Proposed for Listing as Endangered
FC=Candidate for Federal listing
FSS=Former Category 2 Candidate for Federal listing
FSC=Federal Species of Concern

CDFG=California Department of Fish and Game
CE=Listed as Endangered by the State of California
CT=Listed as Threatened by the State of California
SC=California Species of Concern

CNPS=California Native Plant Society
List 1A=Plants presumed extinct in California
List 1B=Plants rare, threatened, or endangered in California and elsewhere
List 2=Plants rare, threatened, or endangered in California but more common elsewhere
List 3=Plants about which more information is needed
List 4=Plants of limited distribution

[b] County Distribution: County codes follow California Department of Transportation three-letter abbreviations, as follows: ALA = Alameda; CCA = Contra Costa; MNT = Monterey; MRN = Marin; SCL = Santa Clara; SCR = Santa Cruz; SLO = San Luis Obispo; SMT = San Mateo; SOL = Solano; SBC = San Benito

TABLE 6
SPECIAL-STATUS ANIMAL SPECIES KNOWN TO OCCUR OR THAT COULD POTENTIALLY OCCUR IN THE PROJECT AREA

Common Name *Scientific Name*	Listing Status USFWS/CDFG	General Habitat	Localities of Occurrence Reported by CNDDB in the Project Area	Potential for Occurrence[a]
Fish				
Pacific lamprey *Lampetra tridentate*	FSC/--	Adults inhabit estuaries and nearby ocean areas with spawning in upstream freshwater gravel beds.	Not reported by CNDDB	Present. Species distribution includes large drainages throughout the Bay, with high quality spawning habitat in Alameda Creek. Electrofishing surveys by SFPUC (2002) identified three Pacific lamprey ammocoetes above Niles Dam, but not above Sunol Dam.
Steelhead/rainbow trout (Central California Coast ESU) *Oncorhynchus mykiss*	FT/--	Drainages within the San Francisco and San Pablo Bays. Central valley rivers and streams.	Not reported by CNDDB	Moderate potential. Resident *O. mykiss* are known to occur in Stonybrook Creek upstream of the project area. Resident *O. mykiss* are also known to occur in Arroyo Mocho and Arroyo del Valle, tributaries to Alameda Creek. Electrofishing surveys by the SFPUC in 2002 did not find any resident *O. mykiss* at Sunol or Niles Dams.
Amphibians				
California red-legged frog *Rana aurora draytonii*	FT/ CSC	Breed in stock ponds, pools, and slow-moving streams with emergent vegetation; adjacent upland habitats are often used outside the breeding season.	CNDDB reports one location adjacent to Sunol Dam.	Present. CRLF were found in a shallow pond between the main channel of Alameda Creek and the access road leading to Sunol Dam (SFPUC, 2003). CRLF were not found in Alameda Creek.
California tiger salamander *Ambystoma californiense*	FT/CSC	Wintering sites occur in grasslands occupied by burrowing mammals; breed in ponds, vernal pools, and slow-moving or receding streams.	There are 56 known occurrences of California tiger salamanders in the six-quadrangle project vicinity. The closest known occurrences are over 3 miles from the project site and include: 0.5 mile west of Sunol Valley; 0.5 mile south of the confluence of Alameda Creek and Arroyo de la Laguna, south of Sunol; 0.3 mile east of San Antonio Reservoir; Alameda Creek at the south end of upper Sunol Valley, southwest of San Antonio Reservoir.	Low potential. Project area provides minimal breeding habitat in Alameda Creek due to the swift current. The minimal grassland habitat identified near the Niles Dam provides a potential upland aestivation site, though no breeding sites were identified nearby.
Foothill yellow-legged frog *Rana boylii*	FSC/CSC	A year-round resident of cobble-lined streams; breeds in spring months after high water subsides.	Not reported by CNDDB	High Potential. Suitable habitat for yellow-legged frogs is found throughout Alameda Creek and in the Niles Canyon project area downstream of Niles Dam. Yellow-legged frogs were not identified in the SFPUC surveys (2002).

TABLE 6 (Continued)
SPECIAL-STATUS ANIMAL SPECIES KNOWN TO OCCUR OR THAT COULD POTENTIALLY OCCUR IN THE PROJECT AREA

Common Name *Scientific Name*	Listing Status USFWS/CDFG	General Habitat	Localities of Occurrence Reported by CNDDB in the Project Area	Potential for Occurrence[a]
Reptiles				
Western pond turtle *Clemmys marmorata*	FSC/CSC	Requires permanent streams and creeks with sandy banks for egg laying.	1.0 mile west of Sunol near Alameda Creek	Present. The project area provides suitable habitat for this species. One adult pond turtle was observed basking on a log near Sunol Dam in 2005 (Leitner, 2005). Pond turtles were not noted during the SFPUC fish or CRLF surveys (SFPUC, 2003).
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT/CT	Inhabits shrub coastal scrub communities; frequently ventures into adjacent habitats, including grassland, oak savanna, and occasionally oak-bay woodland; open-canopy stands and habitats with woody debris and exposed rock outcrops, particularly on south-facing slopes.	Location information suppressed by CNDDB; known occurrences in Niles Canyon	Moderate potential. Coastal scrub habitat near the Niles Dam, on the north side of SR 84, provides excellent habitat for this species. No habitat occurs near Sunol Dam. Habitat for Alameda whipsnake at Niles Dam is separated from the project area by the roadway and a rock wall. Coastal scrub habitat would not be disturbed by the project.
Birds				
Sharp-shinned hawk *Accipiter striatus*	--/CSC	Nests in riparian growths of deciduous trees and live oaks.	Not reported by CNDDB	Moderate potential. Nesting sites are available throughout the wooded riparian margins of Alameda Creek near both dam sites. Several large, inactive nests were detected during spring 2002 surveys.
Cooper's hawk *Accipiter cooperii*	--/CSC	Nests in riparian growths of deciduous trees and live oak woodlands.	Not reported by CNDDB	Moderate potential. Nesting sites are available throughout the wooded riparian margins of Alameda Creek near both dam sites. Several large inactive nests were detected during spring 2002 surveys.
Tricolored blackbird *Agelaius tricolor*	FSC/CSC	Nests in freshwater marshes with dense stands of cattails or bulrushes, occasionally in willows, thistles, mustard, blackberry brambles, and dense shrubs and grains.	Location information suppressed by CNDDB	Low potential. Project area provides some suitable breeding habitat in emergent vegetation stands near both dam sites, but particularly near Sunol Dam.
Bell's sage sparrow *Amphispiza belli belli*	FSC/CSC	Nests and forages in chaparral in the inner Coast Range.	Not reported by CNDDB	Moderate potential. Coastal scrub habitat north of SR 84, north of Niles Dam, provides suitable breeding habitat for this species.

TABLE 6 (Continued)
SPECIAL-STATUS ANIMAL SPECIES KNOWN TO OCCUR OR THAT COULD POTENTIALLY OCCUR IN THE PROJECT AREA

Common Name *Scientific Name*	Listing Status USFWS/ CDFG	General Habitat	Localities of Occurrence Reported by CNDDB in the Project Area	Potential for Occurrence[a]
Birds (cont.)				
Northern harrier *Circus cyaneus*	--/CSC	Nests in coastal freshwater and saltwater marshes, nest and forages in grasslands.	Alameda Creek Marsh; Coyote Hills Regional Park; Plummer Creek	Low potential. The project area provides suitable ground nesting habitat, but foraging habitat is highly limited. This species requires roughly 10 to 20 acres of open grassland foraging habitat, which is not present in either project area.
Great blue heron (nesting) *Ardea herodias*	--/CDFG Special Animal	Colonial nester in tall trees near wetland foraging areas.	Alameda Creek quarries, Fremont	Present. Fourteen great blue heron nests, four of which were active, were observed on April, 17, 2002 in two 80-foot-tall trees on the banks of Alameda Creek. The heron rookery is located 1,000 feet upstream from Sunol Dam in the potential sediment removal area.
White-tailed kite (nesting) *Elanus leucurus*	CDFG fully protected	Nests near wet meadows and open grasslands dense oak, willow or other large tree stands.	Highway 237 in Alviso; Coyote Hills Regional Park; Marsh Road, Newark	Low potential. Nesting sites are available throughout the wooded riparian margins of Alameda Creek near both dam sites, though foraging habitat is highly limited in Niles Canyon.
Loggerhead shrike *Lanius ludovicianus*	FSC/CSC	Scrub, open woodlands, and grasslands.	Not reported by CNDDB	Moderate potential. The project area provides foraging and marginal nesting habitat in surrounding grasslands. Not observed during spring 2002 surveys. No nearby reported breeding occurrences.
Burrowing owl *Athene cunicularia*	FSC/CSC	Nests and forages in low-growing grasslands that support burrowing mammals.	South of the intersection of Osgood Road and Grimmer Boulevard.; adjacent to the Livermore Airport; Warm Springs Road, Fremont	Low potential. Niles Canyon supports chaparral and woodland habitats that provide no habitat components that would support burrowing owl. The small 3- to 5-acre grassland located upstream from Niles Dam is isolated from other breeding and foraging habitat and lacked essential burrowing owl habitat elements such as subterranean burrows.
Mammals				
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	FSC/CSC	Forests and riparian woodlands with moderate canopy cover and brushy understory.	Not reported by CNDDB	Present. At least five large (2- to 3-foot-tall) terrestrial stick houses were observed in the riparian woodlands upstream from Sunol Dam (Pittman, 2002). Though species presence was not verified, woodrats are presumed present.
Greater western mastiff bat *Eumops perotis californicus*	FSC/CSC	Breeds in rugged, rocky canyons and forages in a variety of habitats.	Not reported by CNDDB	Moderate potential. Roosting habitat available in large-diameter oaks and sycamore trees.

TABLE 6 (Continued)
SPECIAL-STATUS ANIMAL SPECIES KNOWN TO OCCUR OR THAT COULD POTENTIALLY OCCUR IN THE PROJECT AREA

Common Name *Scientific Name*	Listing Status USFWS/ CDFG	General Habitat	Localities of Occurrence Reported by CNDDB in the Project Area	Potential for Occurrence[a]
Mammals (cont.)				
Small-footed myotis bat *Myotis ciliolabrum*	FSC/--	Forages over grasslands and roosts in caves and rock crevices.	Not reported by CNDDB	Moderate potential. Roosting habitat available in large-diameter oaks and sycamore trees.
Long-eared myotis bat *Myotis evotis*	FSC/--	Inhabits woodlands and forests up to approximately 8,200 feet in elevation.	Not reported by CNDDB	Moderate potential. Roosting habitat available in large-diameter oaks and sycamore trees.
Fringed myotis bat *Myotis thysanodes*	FSC/--	Inhabits a variety of habitats including valley-foothill hardwood.	Not reported by CNDDB	Moderate potential. Roosting habitat available in large-diameter oaks and sycamore trees.
Yuma myotis bat *Myotis yumanensis*	FSC/--	Open forests and woodlands below 8,000 feet in close association with water bodies.	Not reported by CNDDB	Moderate potential. Roosting habitat available in large-diameter oaks and sycamore trees.
Pacific western big-eared bat *Plecotus townsendii townsendii*	FSC/CSC	Oak and conifer woodlands and arid grasslands.	Not reported by CNDDB	Low potential. The availability of roosting habitat is a limiting factor for this species in the project area. Preferred roosting habitat consists of caves, tunnels, mines, and buildings.

[a] The determination that a particular species is present versus having a potential to be present is based on information from the most current surveys; thus, although resident *O. mykiss* were found in 1998 and 1999, the most current survey, in 2002, did not find the species in the project area. Therefore, occurrence is designated as "potential" rather than "present" since the most recent surveys did not find the species.

Status Codes:

Federal: (U.S. Fish and Wildlife Service)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FP = Proposed for Listing as Endangered or Threatened.
FC = Candidate to become a *proposed* species.
FSC = Federal Species of Concern. May be Endangered or Threatened, but not enough biological information has been gathered to support listing at this time.

State: (California Department of Fish and Game)
CE = Listed as Endangered by the State of California
CT = Listed as Threatened by the State of California
CR = Listed as Rare by the State of California (plants only)
CSC = California Species of Special Concern
3503.5=Protection for nesting species of Falconiformes (hawks) and Strigiformes (owls)

1B = CNPS List 1B, plants rare or endangered in California and elsewhere
2 = CNPS List 2, plants rare or endangered in California, more common elsewhere
3 = CNPS List 3, plants about which more information on distribution is needed
4 = CNPS List 4, plants of limited distribution

SOURCES: CDFG, 2003; USFWS, 2002 and 2003

Diablo Helianthella (*Helinathella castanea*). This large-flowered sunflower is a federal species of concern and is listed on CNPS List 1B. Its range appears limited to the Diablo and Hamilton Ranges, where it occurs in openings in woodland, grassland, and scrub habitats. Suitable, though not ideal, habitat occurs in the forested north-facing slope and the open understory of woodland near Niles Dam. ESA conducted surveys during the flowering period when the plants are in a conspicuous state. However, none were observed by ESA botanists in the project area during the April 2002 surveys.

Special-Status Wildlife

Pacific Lamprey (*Lampetra tridentata*). Pacific lamprey, a federal species of concern, is an anadromous fish species with wide distribution in Bay Area streams.Pacific lamprey spawn in spring months, between April and July. Following a three-week incubation period, larval lampreys emerge and reside in the stream mud or sand substrate for a period of three to five years before swimming to the ocean (Pacific States Marine Commission, 2005). Electrofishing surveys conducted by SFPUC in 2002 identified three Pacific lamprey larvae upstream of Niles Dam (SFPUC, 2002). No lampreys were observed near Sunol Dam. Given migration barriers to adult lamprey at the BART weir and Sunol Dam in Alameda Creek, some larval lamprey are expected to remain in the upper watershed until sexually mature.

Central California Coast Steelhead (*Onchorynchus myskiss*). *O. mykiss* (Central California Coast Evolutionary Significant Unit [ESU]) is a federally listed threatened species. Critical habitat, which was designated for this species by the National Marine Fisheries Service (NMFS) on February 16, 2000, included the Alameda Creek watershed. However, on April 30, 2002, the NMFS withdrew the critical habitat designation pending further economic impact analysis (NMFS, 2002). On September 29, 2003, the NMFS formally withdrew critical habitat designation for the Central California Coast ESU as well as 18 other ESUs (final rule dated September 29, 2003, Federal Register 68: No. 188, 55900). In June 2004, the NMFS proposed including resident *O. mykiss* in the Central California Coast ESU due to genetic similarities between resident and migratory *O. mykiss* within the Alameda Creek watershed upstream of Rubber Dam 1 (NMFS, 2004). The proposed rule is expected to be finalized in December 2005 (NMFS, 2005).

O. mykiss exhibit one of the most complex life histories of any salmonid species. The resident form spends its entire life in freshwater environments, while the anadromous form migrates between its natal streams and the ocean. Migratory *O. mykiss* typically migrate to marine waters after spending one or more years in freshwater. They typically reside in marine waters two to three years before returning to their natal stream to spawn as four or five year olds. Unlike salmon, migratory *O. mykiss* can spawn more than once before they die.

Migratory *O. mykiss* incubate in gravel depressions made by the adult female. The egg incubation period varies based on local conditions such as water temperature and oxygen availability. Juvenile "fry" emerge from the gravel and rear in the freshwater environment for one to four years, after which they migrate to the ocean as smolts. Two reproductive forms are recognized, the "stream maturing" and "ocean maturing" forms, terms that describe the level of sexual

development following return to the freshwater environment. Juvenile steelhead must rear in streams for at least one year before migrating to sea.

Temperature is an important factor for *O. mykiss*, particularly during the over-summer rearing period (Gunther et al., 2000). Upper lethal temperature for Pacific salmonids is in the range of 75 to 77 degrees Fahrenheit (23.9 to 25 degrees Celsius) for continuous long-term exposure (Gunther et al., 2000). Some researchers indicate upper lethal temperature for Pacific salmonids as low as 73 degrees Fahrenheit (22.9 degrees Celsius) (Hanson, 2003). Although steelhead can survive short periods at temperatures above lethal theresholds, especially if abundant food and dissolved oxygen exists. Recent temperature data suggest that summer and early-fall temperatures in Niles Canyon are unsuitable for juvenile steelhead (Hanson, 2003).

Resident *O. mykiss* are known to occur throughout the Alameda Creek watershed, including Alameda Creek, Arroyo Mocho, Arroyo del Valle, and Stonybrook Creek. There is also some evidence to suggest that suitable *O. mykiss* habitat occurs in Niles Canyon (Gunther et al., 2000; Smith, 1999; McEwan, 1999). Resident *O. mykiss* have been reported above the Calaveras Reservoir on several occasions since 1905, including populations in Arroyo Hondo, Isabel, and Smith Creeks (Leidy, 1984). Young-of-year *O. mykiss* have been observed in Stonybrook Creek and Sinbad Creek, tributaries to Alameda Creek (Gunther et al., 2000). However, electrofishing in Sinbad Creek in 1997 and 1998 failed to capture any *O. mykiss*. Stonybrook Creek is regarded as potential *O. mykiss* habitat based on the presence of several age classes of resident individuals, including young-of-year (Gunther et al., 2000).

There is some evidence that native, locally adapted *O. mykiss* stock survives in the Alameda Creek watershed (Gunther et al., 2000). Resident *O. mykiss* were collected below Niles Dam in 1927 and in Stonybrook Creek, a tributary to Alameda Creek, in 1955. Sampling by the Alameda County Water District (ACWD) in 1999 documented the presence of reproducing populations of resident *O. mykiss* in Arroyo Mocho and two tributaries to Alameda Creek, Welch and Pirate Creeks (Buchan et al., 1999). Recent sampling by East Bay Regional Park District staff documented the presence of reproducing trout populations in Stonybrook Creek and Alameda Creek in Sunol Regional Park (Leidy, 2003). Sightings of migratory *O. mykiss* have been reported downstream of the BART weir, adjacent to the inflatable dam operated by the ACWD. In 1998, individuals were captured by citizens groups and released in the mouth of Niles Canyon upstream of the inflatable diversion dam. One of these fish, a gravid female, was tracked to Stonybrook Creek, upstream of Niles Dam (Gunther et al., 2000). There are also reports of migratory *O. mykiss* spawning in Alameda Creek downstream of the middle inflatable dam, and in 1998 fertilized eggs were collected from this area immediately downstream of the BART weir. The eggs hatched successfully and the resulting fry were released into Alameda Creek in Sunol Park (Gunther et al., 2000).

Genetic testing by Nielson (2003) (as reported in NMFS, 2004) suggests that the present self-sustaining populations of resident *O. mykiss* are derived from migratory steelhead that were isolated in the upper part of the watershed by natural processes or by construction of the Calaveras Dam (NMFS, 2004). This research found that these subpopulations were most similar

to each other and other populations within the ESU than to populations outside the ESU.[1] Therefore, the NMFS considers resident *O. mykiss* populations above Dam 1 on Alameda Creek to be part of the Central California Coast *O. mykiss* ESU (NMFS, 2004).[2]

Hatchery-raised *O. mykiss* have been trapped, trucked, and released into Alameda Creek upstream of the project area and may potentially move downstream (Gunther et al., 2000).

Aquatic surveys conducted by the SFPUC in 2002 (which included electrofishing and seine surveys) failed to reveal the presence of adult or juvenile migratory *O. mykiss* in the Niles Canyon reach of Alameda Creek (SFPUC, 2002). The presence of migratory barriers, notably the BART weir (see Figure 1), prevents upstream movement of migratory *O. mykiss*.

California Red-Legged Frog (*Rana aurora draytonii*). California red-legged frog (CRLF) is a federally listed threatened species and California species of special concern. Critical habitat was reproposed on April 13, 2004 using the configuration of the previously published final designation of critical habitat for the CRLF. The critical habitat designation (Unit 15) includes Alameda Creek and its tributaries (USFWS, 2004). CRLF is chiefly a pond frog that can be found in the quiet, permanent waters of ponds, pools, streams, springs, marshes, and lakes. Moist woodlands, forest clearings, and grasslands also provide suitable habitat for this species in the nonbreeding season (Stebbins, 1985). Adult frogs seek waters with dense shoreline vegetation, such as cattails, that provide good cover (Miller et al., 1996), but may be found in unvegetated waters as well.

CRLF breed from January to May. Eggs are attached to vegetation in shallow water and are deposited in irregular clusters (Miller et al., 1996). Tadpoles grow to 3 inches before metamorphosing. CRLF are active year-round along the coast, but aestivate inland from late summer to early winter. Adults consume insects such as beetles, caterpillars, and isopods, while tadpoles forage on algae and detritus.

CRLFs are found on the western slope of the Cascade-Sierran Mountain System, in the North and South Coast Ranges, and in the Transverse Range (Stebbins, 1985). Historically, CRLF were found throughout the Alameda Creek watershed and have bred in ponds near the Sunol Valley Water Treatment Plant.

There is suitable CRLF habitat throughout the Niles Canyon reach of Alameda Creek. CRLF were only found in one large pond adjacent to the access road to Sunol Dam (SFPUC, 2003). SFPUC biologists conducted protocol-level surveys for CRLF in July 2002. The protocol calls for two daylight and two evening surveys, conducted between May 1 and November 1, in all aquatic habitats identified within the vicinity of the project site. Surveys must be conducted at least 24 hours apart, with day surveys occurring during clear and sunny conditions and evening surveys occurring between one hour after sunset and midnight, respectively.

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[1] The Alameda Creek watershed lies geographically within the Central California Coast ESU, as defined by the NMFS.

[2] This DEIR, therefore, addresses potential impacts to resident *O. mykiss* and anadromous *O. mykiss* concurrently.

The SFPUC performed daytime surveys at and near Sunol Dam on July 15 and 17, 2002. These surveys yielded no CRLF. Nighttime surveys were conducted on July 18 and 23, 2002. On July 18, seven CRLF were identified in the pond next to the access road to Sunol Dam. On July 23, 15 CRLF were identified in the pond, and one unidentified frog was observed in this pond. CRLF presumably breed in this pond. CRLF may use the upland areas near Sunol Dam as dispersal corridors or for aestivation sites outside of the breeding season. No CRLF were observed at or near Niles Dam during the survey period. The next known locality of CRLF is at the Sunol Aqueduct, approximately 0.4 mile east of Sunol Dam.

California Tiger Salamander (*Ambystoma californiense*). California tiger salamander is a federally listed threatened species and a California species of special concern. It breeds primarily from December through February and spends the majority of its adult life in subterranean refugia, such as ground squirrel burrows, in grasslands. Adult salamanders emerge for only a few weeks per year from their underground retreats near breeding areas, generally at the height of the rainy season, and move to temporary rain pools, streams, and ponds to mate and lay their eggs. During the short breeding season, salamanders can be observed moving to rain pools, ponds, streams, and lakes. Habitat elements required for species presence include natural or artificial aestivation sites, such as small mammal burrows or debris piles, and suitable breeding sites, which may include ephemeral pools, ponds, or slow-moving streams. Though California tiger salamander have been reported roughly 0.75 mile south of Sunol Dam, this and all other nearby California tiger salamander occurrences have been reported from stock ponds with adjacent grassland habitats, not from Alameda Creek and its associated riparian habitat (CNDDB, 2003). There is a general absence of both upland and aquatic habitat components that would support California tiger salamander near both dams. Additionally, the swift waters of Alameda Creek near both project sites may prevent salamander breeding. Though present locally, California tiger salamanders are not expected to occur in aquatic or upland habitats near either dam.

Foothill Yellow-Legged Frog (*Rana boylii*). Foothill yellow-legged frog (FYLF), a federal species of concern and a California species of special concern, occurs in the Coast Ranges, from the Oregon border south to the Transverse Mountains in Los Angeles County. This species requires shallow, flowing water and prefers small to moderate-sized streams with cobble-sized substrate (Jennings and Hayes, 1994). Females lay eggs between March and early June during periods of high stream flows.

No FYLF were observed during protocol-level surveys for CRLF (SFPUC, 2003). Suitable breeding habitat occurs throughout Alameda Creek, including downstream of Niles Dam in the vicinity of the proposed project.

Western Pond Turtle (*Clemmys marmorata*). Western pond turtle, a federal species of concern and California species of special concern, is an aquatic turtle found in permanent ponds, rivers, streams, and irrigation ditches with rocky or muddy bottoms and emergent vegetation. Basking areas used by this species include partially submerged logs, rocks, vegetation mats, and open mud banks. Habitat destruction and stream course degradation are the primary threats to this species. Potential habitat for western pond turtle was identified upstream and downstream from both dam

sites. Though this species was not observed during surveys, the pools upstream from each dam provide suitable basking and breeding sites for western pond turtle.

Alameda Whipsnake (*Masticophis lateralis euryxanthus*). Alameda whipsnake is a federally listed threatened species and a California-listed threatened species. Though generally thought to inhabit shrub coastal scrub communities, whipsnakes frequently venture into adjacent habitats, including grassland, oak savanna, and occasionally oak-bay woodland (USFWS, 2000). Swaim (1994) found a preference for open-canopy stands and habitats with woody debris and exposed rock outcrops, particularly on south-facing slopes. Telemetry studies have indicated that whipsnakes remain primarily within 170 feet of scrub habitat, but Swaim (1994) reports distances of greater than 500 feet. Adjacent habitats, including grasslands, are used extensively by males during the mating season, and by females following mating. Rock outcrops also provide important habitat components for whipsnakes, in that they both provide escape cover and support their primary food source, the western fence lizard (*Sceloporus occidentalis*).

This species breeds from March through June, with egg clutches from between 6 and 11 eggs. The young snakes hatch and emerge in the late summer to early fall (Swaim, 1994). Scrub habitat that could support this species occurs on the slope immediately north of SR 84 at Niles Dam.

Cooper's Hawk and Sharp-Shinned Hawk. Cooper's hawk (*Accipiter cooperii*) and sharp-shinned hawk (*A. striatus*) are California species of special concern that nest in tall trees and thickets along riparian woodlands and wooded margins. These agile hunters pursue their main prey, small birds, on the wing in dense tree stands. Several large, inactive nests were observed in the riparian canopy upstream from Sunol Dam and could be used by Cooper's hawk. It is likely that either one or both hawks may breed in the project area. The breeding season for these species can start as early as March and last through late August.

Tricolored Blackbird (*Agelaius tricolor*). Tricolored blackbird is a federal species of concern and California species of special concern. Tricolored blackbirds are a colonial species that nests in freshwater marsh vegetation such as cattails, tules, and blackberry thickets. The emergent cattail vegetation that lines Alameda Creek upstream of Sunol Dam may provide a suitable breeding site for tricolored blackbird. This species has been known to forage both along edges of ponds in the immediate vicinity of the nest site and in grasslands and croplands up to four miles from the nest site. Tricolored blackbirds have not been identified in Niles Canyon. There is a low potential for future species occupancy based upon the presence of suitable habitat.

Bell's Sage Sparrow (*Amphispiza belli belli*). Bell's sage sparrow, a federal species of concern and a California species of special concern, is a sedentary year-round resident in the mountainous portions of the Diablo Range. Bell's sage sparrow could occupy the rocky, dry, coastal scrub slopes north of Niles Dam. This species is not expected to use other habitats in the project area, and its use of habitat in close proximity to Niles Dam may be limited by heavy vehicle traffic on SR 84.

Great Blue Heron (*Ardea herodias*). A state-designated special animal due to declining breeding areas, the great blue heron is a year-round resident throughout California. Its habitat includes areas in and around reservoirs, streams, and lakes that have trees for nesting. This species forages in slow-moving streams with adjacent wetlands, feeding on small fish, amphibians, invertebrates, and young birds. Fourteen heron nests, four of which were active, were observed in two adjacent trees roughly 700 to 850 feet upstream from Sunol Dam; eight nests were observed in a 75- to 89-foot-tall sycamore tree, and six in an 80-foot-tall black cottonwood (Pittman, 2002). SFPUC biologists observed several great blue heron chicks in active nests during surveys conducted in 2003 and 2004 (SFPUC, 2005). No other heron nesting sites were observed in the project area. An adult great blue heron was observed foraging in Alameda Creek upstream of Niles Dam (Miles, 2003).

Loggerhead Shrike (*Lanius ludovicianus*). Foraging and nesting habitat for loggerhead shrike, a federal species of concern and California species of special concern, may occur in grasslands and adjacent shrubs upstream of Niles Dam. Potential habitat for this species is generally confined to the limited grasslands that occur on the south streambank.

San Francisco Dusky-Footed Woodrat (*Neotoma fuscipes annectens*). San Francisco dusky-footed woodrat is a federal species of concern and California species of special concern. This species is found in forest habitats with moderate canopy and moderate to dense understory. In riparian areas, the highest densities of woodrats and their houses are often encountered in willow thickets with an oak overstory. Dusky-footed woodrats build terrestrial houses out of sticks and grasses that may reach 2 to 4 feet in height. At least five large (2- to 3-foot-tall) terrestrial stick houses were observed in the riparian floodplain north of Alameda Creek within 1,000 feet of Sunol Dam (Pittman, 2002). Though species presence was not verified in the stick houses, San Francisco dusky-footed woodrats are presumed present.

Special-Status Bats. Habitat for several special-status bats, including greater western mastiff bat (*Eumops perotis californicus*), small-footed myotis bat (*Myotis ciliolabrum*), long-eared myotis bat (*Myotis evotis*), fringed myotis bat (*Myotis thysanodes*), and Yuma myotis bat (*Myotis yumanensis*), occurs in the project area. These bat species are federal species of concern. The greater western mastiff bat is also a California species of special concern. Potential roosting habitat for these bats occurs throughout the wooded riparian fringes of Alameda Creek. Roosting colonies are expected to have a moderate potential for occurrence in mature trees and snags, and large-diameter sycamores, oaks, and other trees. To date, focused bat surveys have not been performed in the project area. The above-mentioned bat species are described below in detail.

Greater western mastiff bat occurs in a variety of arid to semi-arid habitats, including grassland, chaparral, and deciduous woodlands, and is known to utilize trees as roost sites. This species roosts in cliff-face crevices and feeds high above the ground.

The project is located on the northern border of the small-footed myotis bat range, which includes the west and east sides of the Sierra Nevada mountain range, and desert habitats from Modoc County to San Bernardino County (Zeiner et al., 1990). The small-footed myotis bat occurs in a

wide variety of habitats, but primarily in relatively arid wooded and brushy uplands near water. The described nursery roosts for this species include caves, buildings, and bridges, where this bat roosts in small colonies of 12 to 20 individuals (Zeiner et al., 1990). Like most bat species, the small-footed myotis mates in the fall; young are born in May through July, with a peak in May (Zeiner et al., 1990). The small-footed myotis bat forages among trees and over water for a variety of small flying insects, including moths, flies, and beetles.

Long-eared myotis bat is widespread throughout California, except in the Central Valley and southern desert region. Zeiner et al. (1990) report that this species has been found in nearly all brush, forest, and woodland habitats from sea level to 9,000 feet. This species feeds on a variety of insects, including moths, flies, and spiders, and takes more beetles than most myotis species (Zeiner et al., 1990). Long-eared myotis bat nursery colonies number 12 to 30 individuals and can be found in buildings, crevices, and snags and behind tree bark. Individual bats tend to roost singly or in small groups. This species mates in the fall; young are born from May through July, with a peak in June (Zeiner et al., 1990).

Fringed myotis bat occurs throughout California, most frequently in coastal and montane forests and near mountain meadows. It forages over open areas, taking a broad variety of flying insects, especially insects and moths.

Yuma myotis bat ccurs throughout California and is especially common along wooded canyon bottoms. It is a colonial species, roosting in caves and old buildings in aggregations of up to 2,000 individuals. Yuma myotis bats feed on flying insects, especially small moths, beetles, and midges.

Regulatory Framework

A complex array of state and federal regulations and policies direct how biological resources, including special-status species and wetlands, are identified, defined, and regulated. Applicable regulations and policies are described below.

Federal Policies on Riparian Communities in California

Riparian communities have a variety of functions, including providing high-quality habitat for resident and migrant wildlife, streambank stabilization, and runoff water filtration. Throughout the United States, riparian habitats have declined substantially in extent and quality compared with their historical distribution and condition. These declines have increased concerns about dependent plant and wildlife species, leading federal agencies to adopt policies to arrest further loss. USFWS Mitigation Policy identifies California's riparian habitats as belonging to resource Category 2, for which "no net loss" of existing habitat value is recommended (USFWS, 1981).

State Policies and Regulations on Streams and Wetlands

The CDFG regulates activities that would interfere with the natural flow of, or substantially alter, the channel, bed, or bank of a lake, river, or stream. These activities are regulated under California Fish and Game Code Section 1602. Requirements to protect the integrity of biological

resources and water quality are often conditions of Streambed Alteration Agreements. Requirements may include avoidance or minimization of the use of heavy equipment, limitations on work periods to avoid impacts on wildlife and fishery resources, and measures to restore degraded sites or compensate for permanent habitat losses. Heavy equipment would be used from and within the banks of Alameda Creek to facilitate the removal of each dam. As a result, a Streambed Alteration Agreement would be requested from CDFG.

Special-Status Species

Federal Endangered Species Act

Under the Federal Endangered Species Act (FESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (16 United States Code [USC] 1533[c]). Two federal agencies oversee the FESA: the USFWS has jurisdiction over plants, wildlife, and resident fish, while the NMFS has jurisdiction over anadromous fish and marine fish and mammals. Section 7 of the FESA mandates that all federal agencies consult with the USFWS and NMFS to ensure that federal agency actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. The FESA prohibits the "take"[3] of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

Section 10 of the FESA requires the issuance of an incidental take permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or otherwise hurt any individual of an endangered or threatened species. The permit requires preparation and implementation of a habitat conservation plan that would offset the take of individuals that may occur, incidental to implementation of the project, by providing for the overall preservation of the affected species through specific mitigation measures.

Pursuant to the requirements of the FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species may be present in the project area and whether the proposed action will have a potentially significant impact on such species. In addition, the agency is required to determine whether the proposed action is likely to jeopardize the continued existence of any species proposed to be listed under the FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]). Therefore, project-related impacts to these species or their habitats would be considered significant in this DEIR.

The USFWS also publishes a list of candidate species. Species on this list receive "special attention" from federal agencies during environmental review, although they are not protected otherwise under the FESA. The candidate species are those for which the USFWS has sufficient biological information to support a proposal to list as endangered or threatened. Project impacts to such species would be considered significant in this DEIR.

[3] "Take" is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct.

Similarly, the permitting responsibilities of the Corps include consultation with the USFWS and NMFS when federally listed species (i.e., listed under the FESA) are at risk. At both the state and federal levels, the process requires that a Biological Assessment be prepared to determine the effects on listed species. Under both USFWS and CDFG policy, species of concern are not subject to the same consultation requirements as listed endangered, rare, or threatened species, but the agencies encourage informal consultation for species of concern that may become officially listed before completion of the CEQA process.

California Endangered Species Act

Under the California Endangered Species Act (CESA), the CDFG is responsible for maintaining a list of threatened and endangered species (California Fish and Game Code 2070). The CDFG also maintains a list of candidate species, which are species that the CDFG has formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. The CDFG also maintains lists of species of special concern that serve as watch lists. Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that may affect candidate species. Any project-related impacts to species on the CESA endangered list or threatened list would be considered significant in this DEIR. Impacts to species of special concern would be considered significant under certain circumstances.

CEQA Guidelines

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specific criteria. These criteria have been modeled after the definitions provided in the FESA and in the section of the Fish and Game Code discussing rare and endangered plants and animals. Section 15380(b) was included in the guidelines primarily for situations in which a public agency is reviewing a project that may have a significant effect on a candidate species that has not yet been listed by the CDFG or USFWS. CEQA provides the ability to protect species from potential project impacts until the respective agencies have the opportunity to designate the species for protection.

CEQA also specifies the protection of other locally or regionally significant resources, including natural communities or habitats, although natural communities do not presently have legal protection. The CDFG considers natural communities listed as sensitive in the CNDDB to be significant resources. Local planning documents such as general and area plans often identify natural communities.

CEQA directs each lead agency to consult with the CDFG on any project the agency initiates that is not statutorily or categorically exempt from CEQA. CEQA Guidelines (Section 15065[a])

declares that impacts to rare, threatened, or endangered plants or animals are significant. The Native Plant Protection Act (see below) also affords limited protection to special-status plant species. A formal consultation process must be initiated with the CDFG for projects that may or will have an adverse effect on state-listed species (i.e., listed under the CESA).

Other Statutes, Codes, and Policies Affording Limited Species Protection

The federal Migratory Bird Treaty Act (16 USC Section 703, Supp. I, 1989) prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs, and nests, except in accordance with regulations prescribed by the Secretary of the Interior. Birds of prey are protected in California under Fish and Game Code Section 3505.5. Under this section it is "unlawful to take, possess, or destroy the nests or eggs of any such bird except otherwise provided by this code or any other regulation adopted hereto." Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment and/or reproductive failure. The CDFG considers disturbance that causes nest abandonment or reproductive failure to constitute a take. Any loss of eggs, nests, or young or any activities resulting in nest abandonment is considered a significant impact. Project impacts to these species would not be deemed significant unless the species are known or have high potential to nest in the project area or to rely on it for its primary foraging.

Several common and special-status bird and raptor species have the potential to be affected by the project, including: great blue heron, sharp-shinned hawk, and Cooper's hawk.

Plants

Native Plant Protection Act

Fish and Game Code Sections 1900–1913 are intended to preserve, protect, and enhance endangered or rare native plants in California. The act directs the CDFG to establish criteria for determining what native plants are rare or endangered. Under Section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more cause. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens. The act also directs the California Fish and Game Commission to adopt regulations governing the taking, possessing, propagation, or sale of any endangered or rare native plant.

Vascular plants listed as rare or endangered by the CNPS (Skinner and Pavlik, 2001), but which have no designated status or protection under federal or state endangered species legislation, are defined as follows:

List 1A: Plants believed extinct

List 1B: Plants rare, threatened, or endangered in California and elsewhere

List 2: Plants rare, threatened, or endangered in California, but more numerous elsewhere

List 3: Plants about which more information is needed

List 4: Plants of limited distribution

In general, plants appearing on CNPS List 1 or 2 are considered to meet CEQA's Section 15380 criteria, and impacts to these species are considered significant in this EIR. Several special-status plants have a potential to occur within the project area (see Table 5).

Wetlands

Wetlands and nonwetland water resources (e.g., rivers, streams, and natural ponds) are a subset of waters of the United States[4] and receive protection under Section 404 of the CWA. The Corps is the major regulatory agency involved in wetland regulation under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. Additional agencies that have jurisdiction over onsite wetlands include the U.S. Environmental Protection Agency (oversight authority on Corps 404 permits), USFWS, CDFG, and the California State Water Resources Control Board (SWRCB).

Through the nine Regional Water Quality Control Boards (RWQCBs), the SWRCB regulates discharge and/or fill to waters of the state under Section 401 of the CWA and under the California Clean Water Act (Porter-Cologne Water Quality Control Act). The RWQCBs are authorized to ensure that actions permitted by the Corps under Section 404 also meet state water quality standards.

Under Sections 1600–1616 of the California Fish and Game Code, the CDFG regulates activities that would alter the bed, channel, or bank of any river, stream, or lake designated by the department in which fish or wildlife resources exist or from which these resources derive benefit. The CDFG is also authorized to develop mitigation measures and to enter into a Streambed Alteration Agreement with applicants that propose a project that would adversely affect a river or stream, including intermittent and ephemeral streams. The SWRCB must certify that a Corps permit action meets state water quality objectives (Section 401, CWA).

CEQA Guidelines Section 15206 specifies that a project shall be deemed to be of statewide, regional, or areawide significance if it would substantially affect sensitive wildlife habitats, including but not limited to riparian lands, wetlands, bays, estuaries, marshes, and habitats for rare and endangered species.

Impact Analysis

Significance Criteria

The City of San Francisco has not formally adopted significance standards for biological resources impacts, but generally considers that implementation of the proposed project would have a significant effect on biological resources if it were to:

[4] The regulatory term "waters of the United States," as used by the U.S. Army Corps of Engineers, has broad meaning and incorporates both deep-water aquatic habitats and special aquatic sites, including wetlands.

- Interfere substantially with the movement of any resident or migratory fish or wildlife species, or with established fish or wildlife migratory or dispersal corridors;

- Have a substantial adverse effect on the habitat of endangered, threatened, candidate, or rare species, or other sensitive natural community identified in local or regional plans, policies, regulations, or by lists compiled by the CDFG, USFWS, or NMFS;

- Have a substantial adverse effect on any species identified as threatened, endangered, sensitive (rare), as discussed in CEQA Guidelines Section 15380; or

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA, or riparian areas under the jurisdiction of the CDFG, as defined by Fish and Game Code Sections 1600–1616.

CEQA Guidelines Section 15380 further provides that a plant or animal species may be treated as rare or endangered even if not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future.

Based on guidelines established by the USFWS and CDFG, a project could be considered to have a significant adverse impact on biological resources if it would result in substantial disruption to, or destruction of, any special-status species, its habitat, or breeding grounds. A project would also be considered to have a significant impact if it would result in a substantial loss of important plant or animal species; cause a change in species composition, abundance, or diversity beyond that of normal variability; result in the direct or indirect, measurable degradation of sensitive habitats (e.g., wetlands, riparian corridors, vernal pools, oak woodlands); or result in loss of a significant plant community.

Impacts

Special-Status Species

Special-status species that have a moderate to high potential to occur in the vicinity of the proposed project include:

- Large-flowered fiddleneck
- Showy Indian clover
- Santa Clara red ribbons
- Big tarplant
- Western leatherwood
- Steelhead
- Pacific lamprey
- California red-legged frog
- Foothill yellow-legged frog
- Alameda whipsnake
- Western pond turtle
- Great blue heron (nesting)
- Sharp-shinned hawk
- Cooper's hawk

- Dusky-footed woodrat
- Greater western mastiff bat
- Small-footed myotis bat
- Long-eared myotis bat
- Fringed myotis bat
- Pacific western big-eared bat
- Yuma myotis bat

Suitable habitat exists in the project area for special-status plants. Surveys by ESA botanists and Leitner conducted in April 2002 and May 2005, respectively, did not reveal the presence of special-status plant species. Grubbing, site clearing activities, installation of access roads, removal of dam debris, and general dam removal activities could affect these species if they were to occur in the project area. This impact would be potentially significant but mitigable.

Suitable habitat exists within the vicinity of Sunol Dam for the following special-status plants:

- Large-flowered fiddleneck
- Showy Indian clover
- Santa Clara red ribbons
- Western leatherwood

Suitable habitat exists within the vicinity of Niles Dam for the following special-status plants:

- Large-flowered fiddleneck
- Big tarplant
- Santa Clara red ribbons
- Diablo helianthella

Jurisdictional wetlands and waters could be affected by the project. Indirect impacts to wetlands and other waters could occur during dewatering activities or from accidental spills of oil, gasoline, or other debris. Direct impacts to jurisdictional features could include clearing and grubbing activities and temporary fill from installation of access roads and cofferdams. It is expected that the total permanent loss to jurisdictional features would not exceed 0.5 acre. Impacts to jurisdictional waters would be potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-2a would reduce these impacts to a less-than-significant level.

Potential direct impacts to *O. mykiss* and Pacific lamprey and their habitats could result from temporary dewatering of Alameda Creek, short-term sedimentation and turbidity of Alameda Creek during and after dam removal, temporary alteration of the riparian habitat, and accidental spills of gasoline, oil, or other toxic substances. This is a potentially significant but mitigable impact. Implementation by the SFPUC of Mitigation Measure D-3 would reduce these impacts to a less-than-significant level.

Although no FYLF were found in the project area during protocol surveys for CRLF (SFPUC, 2003), suitable habitat occurs within Alameda Creek, including downstream of Niles Dam within

the project area. Potential impacts to this species could include indirect impacts to its habitat, such as accidental spills of oil or gasoline from work trucks, and impacts to water quality, including increased sedimentation or temporary impacts from dewatering of Alameda Creek, and increased human presence. Potential direct impacts could include individual frogs being killed by machinery or work trucks. This is a potentially significant but mitigable impact. Implementation by the SFPUC of Mitigation Measure D-4a would reduce these impacts to a less-than-significant level.

The proposed project could result in the loss or disturbance of potential aquatic breeding habitat and associated upland habitat for CRLF at Sunol Dam. CRLF are known to occur in a pond adjacent to the access road to Sunol Dam (SFPUC, 2002). This access road would be used to transport materials, equipment, and personnel to and from the worksite. As described in Chapter III, Project Description, some portions of this access road might need to be widened to accommodate equipment and machinery. Widening of the access road could result in indirect impacts to CRLF habitat, such as accidental spills of oil, gasoline, or other toxic substances or increased sediment (dust or dirt from machinery) in breeding habitat. Potential direct impacts could include individual frogs being killed by machinery or work trucks. Clearing and grubbing activities adjacent to known breeding habitat for CRLF could result in temporary impacts to associated upland habitat for this species.

In addition, removing Sunol Dam to an elevation of about 194 feet above mean sea level would in effect lower the hydraulic head (i.e., the area of water impoundment behind Sunol Dam) along this reach of Alameda Creek by roughly 10 feet (see Section IV.F, Hydrology, Groundwater, and Water Quality, for more detail). Lowering the impounded area would have a direct effect on adjoining groundwater levels. In the vicinity of the ponds, it is reasonable to assume that an average reduction in groundwater levels would be 3 to 7 feet. Thus, post-Sunol Dam removal, seasonal marsh conditions in the ponds might not be maintained, thereby affecting the population of CRLF inhabiting these ponds. The potentially significant impacts to CRLF described above would be mitigable. Implementation by the SFPUC of Mitigation Measures D-4a and D-4b would reduce these impacts to a less-than-significant level.

CRLF is not known to occur in the vicinity of Niles Dam, and no impacts to this species are expected. Preferred aquatic breeding habitat does not occur in Alameda Creek within the project area. The stream characteristics of Alameda Creek within the project area can best be described as low-gradient glides with very few, if any, riffle-pool complexes. Many portions of the creek have only about 50 percent or less canopy cover, allowing for relatively high water temperatures during late spring and summer. Water temperatures within these reaches are likely too high for CRLF during the spring and summer. The pools upstream and the plunge pools downstream of each of the dams do not likely provide suitable breeding habitat for CRLF because these pools are approximately 3 to 5 feet deep, and substrate consists mostly of fine sediment and some gravel and small cobbles.

Western pond turtles have the potential to occur in freshwater drainages throughout the project area, specifically in Alameda Creek. Potential temporary indirect impacts to western pond turtles

could occur during dewatering activities, debris removal work, and general dam removal activities. Indirect impacts could also result from accidental spills of oil, gasoline, or other debris as well as from nest abandonment due to increased human presence. Direct impacts such as individual mortality could result from heavy equipment or other construction activities within or adjacent to pond turtle habitat. The potential loss or disturbance of western pond turtles and their habitat is potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-5 would reduce these impacts to a less-than-significant level.

No habitat for Alameda whipsnake was observed near Sunol Dam, but scrub habitat that could support the whipsnake occurs on the slope immediately north of SR 84 near Niles Dam. The proposed project would not disturb this habitat because it is outside the project area footprint. However, if individual snakes are present on the access roads when vehicle traffic passes, direct impacts to this species (e.g., injury or mortality) could occur. This impact is potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-6 would reduce this impact to a less-than-significant level.

Raptors and passerine birds (song birds) nest in trees, dense riparian vegetation, shrubs, and within the annual grassland areas in the vicinity of the proposed project. Potential habitat for other raptors, including sharp-shinned hawk and Cooper's hawk, occurs within larger trees found within the project area. Potential nesting habitat for other raptors and passerine birds occurs within the trees and shrubs along Alameda Creek and within the project area. Direct project impacts to nesting birds and raptors could include removal of nests and mortality of young during site clearing and grubbing activities. Indirect impacts to nesting birds and raptors could occur during any dam removal activities that result in increased noise or human presence. These impacts are potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-7a would reduce these impacts to a less-than-significant level.

In addition, a great blue heron rookery is located within the project area, about 800 feet upstream of Sunol Dam. Impacts on great blue herons and their nesting habitat could occur during site clearing and grubbing activities and during general dam removal activities involving either the jack-hammer removal method or the controlled blasting method if active nesting occurs during the dam removal period. Dam removal activities could affect herons at the rookery due to noise and increased human presence. This noise impact from dam removal would be potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-7b, which includes the installation of noise dissapators and blasting mats if the controlled blasting method is used, would reduce this impact to a less-than-significant level.

Habitat for San Francisco dusky-footed woodrat occurs within the project boundary, and this species is considered present. Potential temporary impacts to habitat for dusky-footed woodrat would result from site clearing and grubbing activities before dam removal and from increased human presence in and around the habitat for this species. This impact would be potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-8 would reduce this impact to a less-than-significant level.

Riparian woodland vegetation occurs along the banks of Alameda Creek in the Sunol and Niles Dam project area. Riparian trees and shrubs would be removed to construct access roads and provide materials and equipment access. The loss or degradation of riparian habitat could result in the degradation of sensitive plant communities, fragmentation or isolation of important wildlife habitats, and/or disruption of wildlife movement corridors. This impact would be potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-9 would reduce this impact to a less-than-significant level.

Dam removal activities could lower groundwater levels and remove backwater areas that support riparian vegetation. As Alameda Creek and its bed and banks adjust to the new stream channel configuration, some riparian vegetation could be temporarily lost. Over time, new sediment would be deposited and vegetation would recolonize these areas. As groundwater levels adjust, riparian vegetation would move closer to the center of the main channel, replacing the vegetation temporaily lost after dam removal. This impact would be temporary, and no permanent loss of riparian vegetation is expected. To ensure that there is no permanent loss of riparian vegetation, which would be a potentially significant impact, the SFPUC would implement Mitigation Measure D-9.

The project area provides habitat for common plant and animal species, such as belted kingfisher, Pacific tree frog, and black-tailed deer. Site clearing and grubbing, access road construction, and general dam removal activities could result in disturbance to, or direct mortality of, common plant and wildlife species. Direct impacts to wildlife species could include both mortality of resident species and habitat loss and degradation. Mortality would include road kills as well as species losses due to the destruction of habitat. Indirect impacts could occur from noise disturbance due to increased human presence. Temporary dam removal disturbances could include the displacement of animals due to construction noise and loss of habitat. Such habitat loss could be permanent for some species, including belted kingfisher. Because the potential loss or disturbance is to common plant and animal species, this impact would be less than significant.

The large trees within the project area provide potential habitat for roosting and breeding bats. The larger oaks and sycamores provide suitable nesting and roosting habitat, and Alameda Creek provides the required nearby water source. No bat surveys have been conducted, however, so the presence of bats cannot be ruled out. Potential direct impacts to special-status bats include removal of habitat and roost sites during site clearing and grubbing activities. Indirect impacts include increased noise and human presence during general dam removal activities. These impacts are potentially significant but mitigable. Implementation by the SFPUC of Mitigation Measure D-10 would reduce these impacts to a less-than-significant level.

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E. Geology, Soils, and Seismicity

Setting

This section describes topography, geology, soils, mineral resources, seismicity, and landslide potential in the project area. The Setting section provides a description of existing conditions in the project area and vicinity. The Regulatory Framework section describes the pertinent federal, state, and local laws related to geology, soils, and seismicity. The Impacts section defines the significance criteria and presents a discussion of the potential impacts. A description of hydrology and geomorphology is provided in Section IV.F, Hydrology, Groundwater, and Water Quality.

Topography

Northwest-trending ridges and valleys control the relief of the Alameda Creek watershed. The east-west-trending La Costa Valley includes San Antonio Reservoir and constitutes a major portion of the Alameda Creek watershed in the northern section. The rugged upland terrain of Oak Ridge, Poverty Ridge, and Apperson Ridge surrounds the major valleys. Sunol Dam is located within the Sunol Valley, while Niles Dam is located in Niles Canyon.

Elevations in the watershed range from about 100 feet above mean sea level (msl) at the mouth of Niles Canyon to about 3,300 feet above msl in the southeastern corner of the watershed on Poverty Ridge. Slopes in the upland areas are steep, with average gradients ranging from about 3:1 (horizontal to vertical ratio) to 1:1. The major valleys have nearly level floors. Most of the tributary stream valleys are very narrow, with V-shaped cross-sections. Sunol Dam is at an elevation of about 220 feet, and Niles Dam is at an elevation of about 120 feet.

Sunol Dam is situated at the end of a relatively straight reach (approximately 2,000 feet) of Alameda Creek. Downstream of the dam, the creek meanders to the left (looking downstream) as it enters Niles Canyon. The southwest side (the left bank) of Alameda Creek in this area is bordered by steep slopes that rise to about 400 feet above the creek at the dam. The northeast side (the right bank looking downstream) of the creek, upstream of the dam, is bordered by a broad, alluvium-filled terrace. The leading edge of this terrace forms a low scarp that rises an average of about 10 to 15 feet above the creekbed.

Niles Dam is located in the Niles Canyon reach of Alameda Creek at river mile 12.8. State Route (SR) 84 parallels the creek through Niles Canyon and lies directly adjacent to the dam site. Niles Canyon is a relatively narrow, deeply incised valley that meanders through the local Coast Ranges. Review of a site topographic map indicates that the ground surface of the alluvium is approximately 10 to 15 feet above the water level in Alameda Creek and, in the vicinity of Niles Dam, forms a very small floodplain about 200 feet wide and 100 feet long upstream from the dam and on the south side of Alameda Creek. Below Niles Dam the floodplain appears to be restricted by the canyon walls, while 1,250 feet upstream and beyond the canyon restricts the floodplain to even smaller dimensions.

Geology

The watershed is located along the western flank of the northern Diablo Range, within the geologic region of California referred to as the Coast Ranges Geomorphic Province. This province is geologically complex and seismically active and is characterized by northwest-trending faults, mountain ranges, and valleys. The Diablo Range forms the eastern boundary of the Coast Ranges and separates the geologic structural depressions of San Francisco Bay and Santa Clara Valley to the west and San Joaquin Valley to the east.

The watershed is composed of two distinct stratigraphic rock sequences separated by the northern section of the Calaveras Fault Zone. The fault zone separates the Hayward Hills (to the west), which includes the project area, from the Diablo Range (to the east). The Hayward Hills consist of sedimentary rocks of the Great Valley Sequence, which includes the Panoche Formation.[1] The Diablo Range is composed primarily of sedimentary and metamorphic rocks of the Franciscan Complex.[2] Within the watershed, marine deposits overlie both of these units, along with younger surficial alluvium (deposited by streams).

Surficial deposits include recent alluvium and landslide deposits. The alluvial deposits include older stream terrace and active stream channel deposits that are most extensive in the Sunol, La Costa, and Amador Valleys. These deposits are an important source of aggregate mineral resources and form large areas of prime farmland soils. Surficial deposits in the Alameda Creek streambed at both dams consist of stream channel deposits (Holocene) containing poorly to well-sorted silty sand, sand, or sandy gravel with minor cobbles (Graymer et al., 1994).

Interbedded shale and sandstone (bedrock) of the Panoche Formation is exposed nearly continuously along the base of the creekbed slopes both upstream and downstream of Sunol Dam. For several hundred feet upstream of the dam the thalweg, or main channel, of Alameda Creek lies along the northeast side of the creek and is bordered by the edge of the alluvial terrace.

The left and right abutments of Sunol Dam (looking downstream) appear to be founded on exposed fractured bedrock. An access road that runs parallel to the creek is built on a berm of artificial fill that ranges from about 5 to 10 feet thick and is roughly 100 feet wide. At the dam site, the fill ranges from about 7 to 9 feet thick.

At Niles Dam, the canyon walls are largely bedrock. The current dam was constructed over the top of an existing dam, which is thought to have been constructed on bedrock (Geomatrix Consultants, 2004). Alameda Creek follows an incised cutting that forms the canyon. The stream channel is located within a small floodplain of alluvial sediments and is confined by the bedrock walls of the canyon. Artificial fill has been used to construct Niles Canyon Road (SR 84).

According to Geomatrix Consultants(2004), the stream deposits, or alluvial sediments, exposed in and around the active stream channel consist of slightly silty sand with cobbles and boulders.

[1] The Great Valley Sequence is a series of marine sediments that include undivided sandstones, conglomerates, siltsotones, and shales.

[2] The Franciscan Complex is a highly fragmented, folded, and deformed sequence of sandstones, shales, conglomerates, cherts, greenstones, and graywackes.

Generally sub-rounded cobble and boulder-sized clasts of sandstone constitute the majority of deposits (approximately 60 to 70 percent). The edges of the active stream include braided channels and gravel bars that support a riparian community in the upper sections. The bottoms of these braided sections were covered with a thin deposit of moist to wet silty sand. The thickness of alluvial deposits in the canyon is unknown; however, the base of Alameda Creek approximates the upper surface of bedrock, suggesting that alluvial deposits range up to 10 to 20 feet thick. Geomatrix Consultants prepared a geological map of the area in the vicinity of Niles Dam (see Figure 11).

Soils

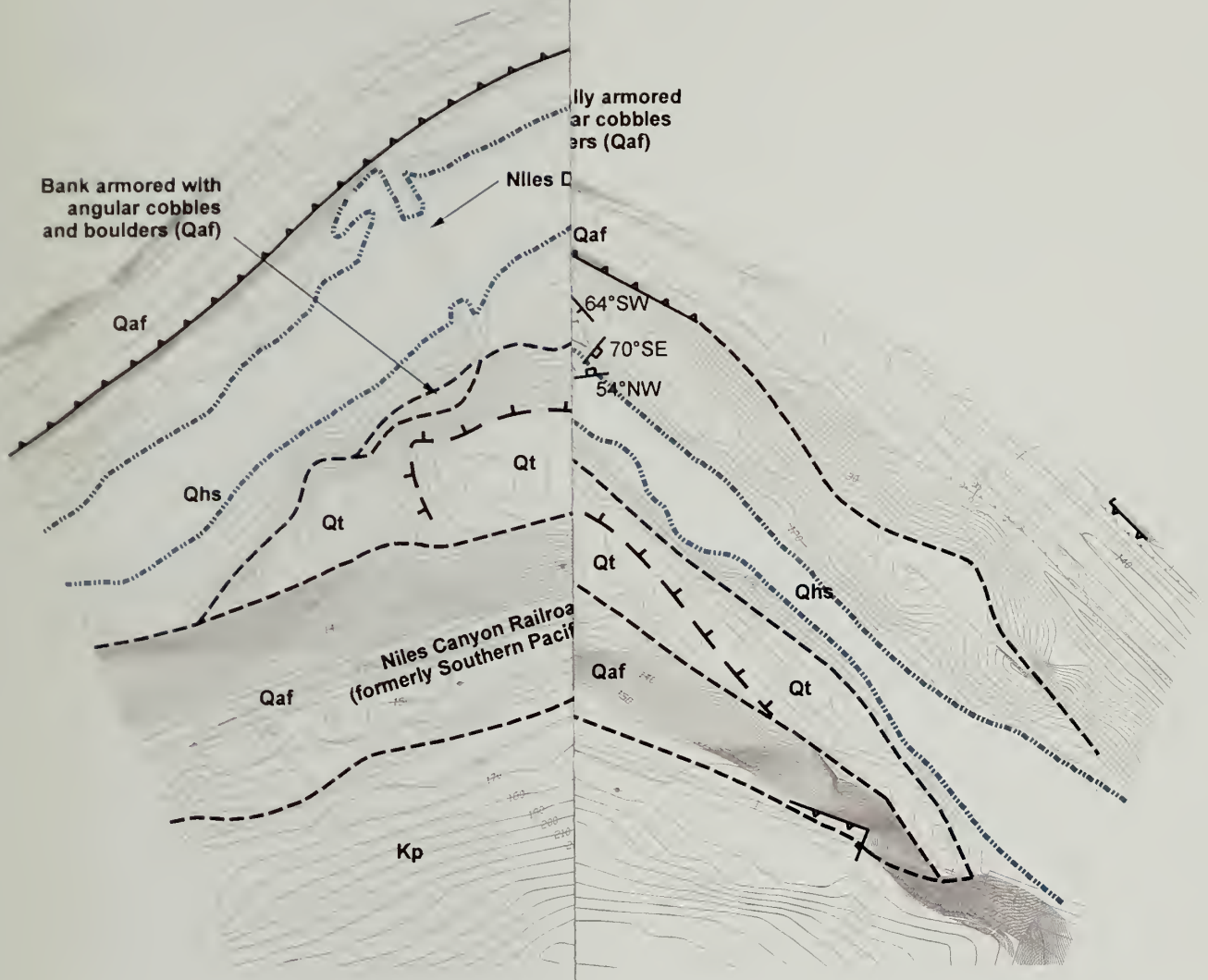
The soils in the watershed generally reflect the underlying geology, with variations related to slope position and stability. A summary of the soils in the project area is provided in Table 7. In areas underlain by sedimentary rocks, the soils generally consist of the Millsholm–Los Gatos–Los Osos association; in areas underlain by rocks of the Franciscan Complex, soils generally consist of the Vallecitos-Parish association (ESA, 1994). Upland soils generally drain well, are moderately deep, and can readily erode. Soils of the Yolo-Pleasanton association develop on the alluvial deposits. These soils are generally well drained, very deep, and have a low potential for erosion.

Over 50 percent of the Alameda Creek watershed has soil units described as susceptible to topsoil erosion (USDA, 1961). These areas are particularly sensitive to further loss of the topsoil, due to the existing limited soil depth, water holding capacity, and fertility. Soil erosion hazard is a measure of the susceptibility of a soil to erosion by sheet wash, rilling, or gullying.[3]

Accelerated erosion in this region has occurred through both sheet erosion and gully erosion. Sheet erosion, the removal of soil more or less uniformly in a thin layer, is more damaging and less obvious than gullying. Few of the upland soils, except the Positas soils, have inherent soil characteristics that make them highly erodible. However, the soils are highly sensitive to disturbance and are highly erodible under several land use situations, including cultivation and grazing. Most cultivated soils have eroded because of slope and the agricultural methods used.

Numerous soil types throughout the watershed have erosion hazard ratings of severe and very severe. The highest erosion ratings are generally correlated to slope angle, with very severe erosion hazards for soils on slopes steeper than 3:1, regardless of parent material. A few soils, including the Gaviota rock sandy loam, Los Osos clay loam, and Positos gravelly loam, have severe erosion hazards even at lower slope angles.

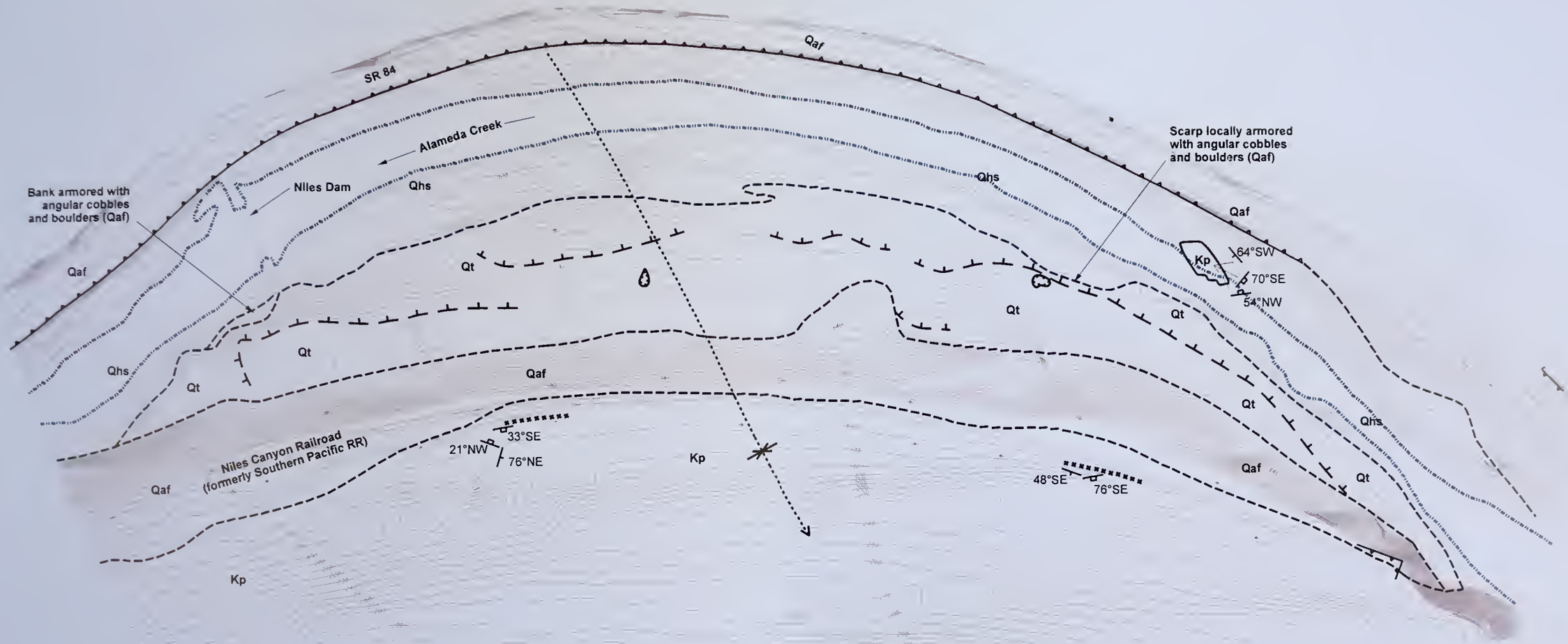
[3] Sheet wash is the removal of thin layers of surface material over a broad area, also referred to as sheet erosion. Rilling, or rill erosion, is the development of numerous closely spaced channels that remove surface soil in streamlets. Gullying, or gully erosion, is the erosion of soil by running water, which forms distinct channels that are more substantial than rills.



SOURCE: Geomatrix, 2004

NOTE: Base map prepared by MDL & Associates, Inc.
Map projection is State Plane NAD83; Vertical datum is NGVD29.

Figure 11
Geologic and Topographic Map
of Niles Dam Site



MAP SYMBOLS

- Erosional scarp, queried where uncertain
- Geologic contact, dashed where approximate, dotted where inferred, queried where uncertain
- Approximate edge of water in Alameda Creek on 1/28/03
- Synclinal axis (approximate)
- Major topographic contour (interval = 10 feet)
- Minor topographic contour (interval = 1 foot)
- Retaining Wall
- Open pit
- Outcrop of bedrock
- 76°NE — Strike and dip of bedding
- 21°NW — Strike and dip of joint/fracture

GEOLOGIC UNITS

- **Qaf** Artificial fill (Historic)
- **Qhs** Stream Channel Deposits (Holocene)
- **Qt** Alluvial Terrace Deposits (Quaternary)
- **Kp** Panoche Formation, Sandstone and Shale (Cretaceous)

0 100 Feet

SOURCE: Geomatrix, 2003

NOTE: Base map prepared by MDL & Associates, Inc.
Map projection is State Plane NAD83; Vertical datum is NGVD29.

Figure 11
Geologic and Topographic Map of Niles Dam Site

TABLE 7
SOIL ASSOCIATIONS WITHIN THE PROJECT AREA

Location	Soil Symbol	Soil	Soil Type	Erosion Potential
Alameda Creek (Niles and Sunol Dams)	LpF2	Los Gatos–Los Osos complex, 30 to 45 percent slopes, eroded	1 foot of loam over 2.5 feet of heavy loam underlain by hard sandstone; depth to rock from 1 to 4 feet	Drainage is good to somewhat excessive; moderately low permeability, severe erosion potential.
Arroyo de la Laguna	YmB	Yolo loam, 3 to 10 percent slopes	About 1.5 feet of loam on 2.5 feet of fine sandy loam, over many feet of loam	Drainage is good; runoff is slow to moderate, and erosion hazard is slight to moderate.

SOURCE: Soil Conservation Service, 1961

Mineral Resources

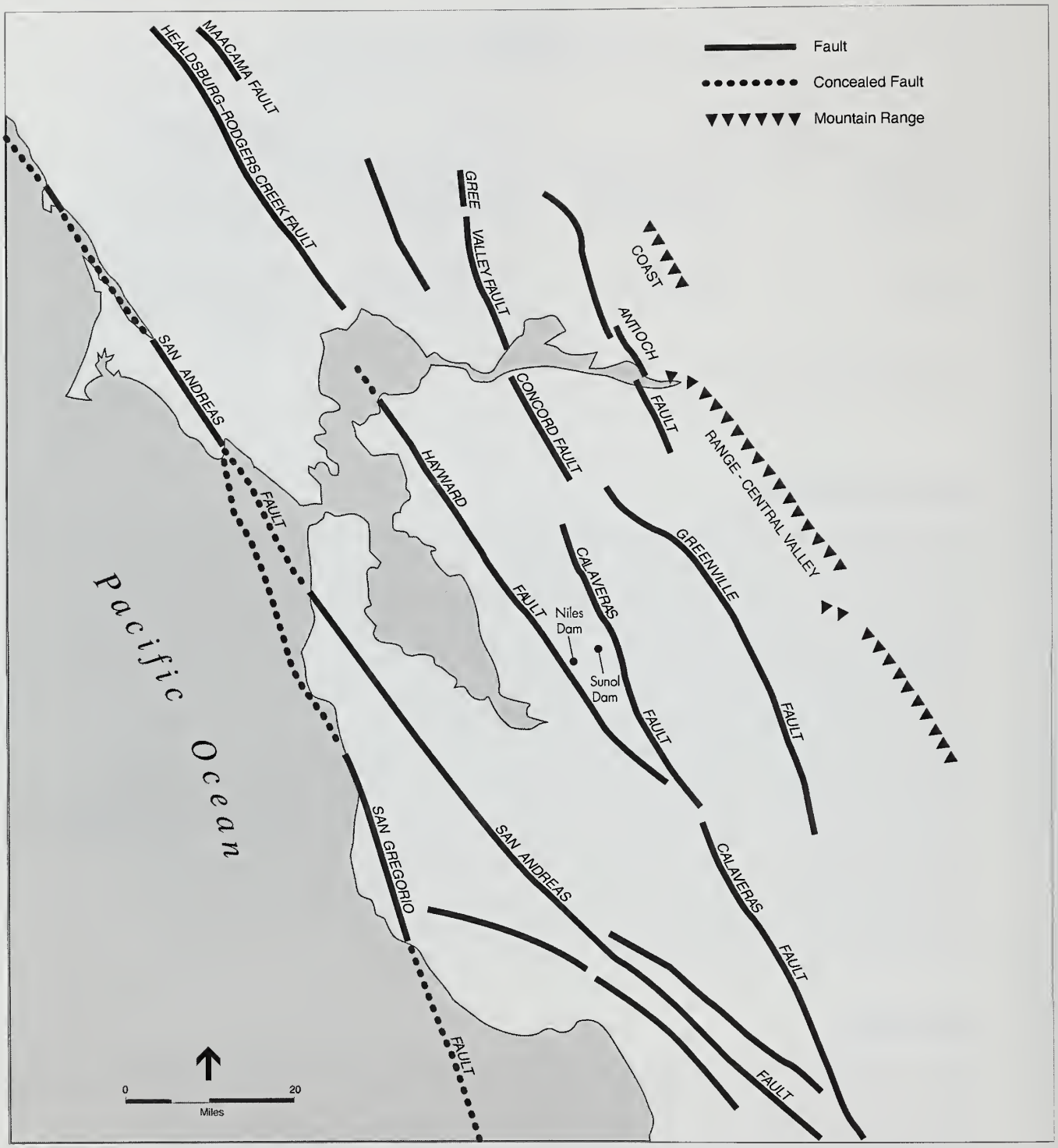
Historical and current gravel mining operations in the Sunol Valley, in which Sunol Dam is located, have removed a large quantity of the valley's alluvium, which has altered surface and groundwater flow as well as groundwater storage. Mining operations involve major earthmoving and excavation activities, and historical mining has resulted in several excavations along Alameda Creek, upstream of Sunol Dam and Niles Dam. The Mission Valley Rock Company and RMC Pacific Materials currently operate active sand and gravel quarries within the watershed. As mandated by the Surface Mining and Reclamation Act (SMARA) of 1975, the California Geological Survey classifies lands within the San Francisco–Monterey Bay region into Mineral Resource Zones (MRZs). The MRZ-2 classification includes areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence. The MRZ-3 classification includes areas containing mineral deposits for which the significance cannot be evaluated from available data. Aggregate mineral resources have been identified within the watershed lands in the Sunol Valley. MRZ-2 classifications are restricted to portions of Sunol Valley (Stinson et al., 1983). However, no gravel mining operations have occurred in the vicinity of the Sunol or Niles Dams.

Seismicity

The Coast Ranges province is highly active tectonically and includes active strike-slip faults as well as active folding and thrust faulting associated with this continental margin (see Figure 12 for the location of active faults in the region). The active faults located within this province include the San Andreas, Hayward, Calaveras, and Greenville faults (CDMG, 1999).[4]

The San Andreas Fault Zone, a major structural feature that forms a boundary between the North American and Pacific tectonic plates, lies approximately 20 miles southwest of Niles Dam. The

[4] Active faults are defined as faults showing evidence of Holocene age displacement (in the last 11,000 years).



SOURCE: Jennings, 1994

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Figure 12
Regional Fault Map

Hayward fault is associated with the San Andreas Fault System. The Hayward fault crosses Alameda Creek approximately 2.5 miles southwest of Niles Dam. A major earthquake occurred along this fault in 1868, centered in the Berkeley Hills (San Leandro), with a Richter magnitude of 7.0.[5] The estimated slip rate of this fault is reported to be 9.0 ± 1 millimeters per year (mm/yr). Much of the slip on the fault occurs as seismic creep[6]; nevertheless, this fault has a high level of seismicity and should be considered capable of an earthquake with a magnitude of 7.1 (ABAG, 2004a).

The Calaveras fault is also associated with the San Andreas Fault Zone and is located approximately 1.5 miles northeast of Sunol Dam. The Calaveras fault is one of the largest in California and has a vertical component responsible for the upward movement of the west side of the fault. A characteristic earthquake on this fault would be expected to have a magnitude of 6.8 (ABAG, 2004b). The relative amount of horizontal movement is not exactly known, but has been estimated to be between 3 and 13 miles. Major earthquakes have occurred along this fault since 1800, including a 1984 earthquake centered about 16 miles east of Watsonville at Coyote Dam (with a Richter magnitude of 6.2), and a 1911 earthquake centered east of San Jose (with a Richter magnitude of 6.6). The fault crosses the Hetch Hetchy Aqueduct at Calaveras Road on the east flank of the Sunol Valley.

The Greenville fault is a right-lateral, strike-slip fault associated with the San Andreas Fault System and lies approximately 14 miles northeast of Sunol Dam. A 1980 earthquake is the only significant recorded movement on the fault; it was centered about four miles northeast of Livermore, where the fault crosses Altamont Pass Road. This earthquake had a Richter magnitude of 5.8 (Bedrossian, 1980).

Landslide Potential

Factors affecting slope instability include soil moisture, slope angle, and slope behavior during a seismic event. Human interaction, including road and trail construction, can undermine and reduce the stability of a hillside slope. Landslides are relatively common in the vicinity of the project area and are pervasive throughout many of the upland areas within the region of Sunol Valley and Niles Canyon. Slopes in the upland areas surrounding the project area have been rated as unstable (Category 5) and moderately unstable (Category 4). The only portions of the watershed rated as stable (Category 1) or generally stable (Category 2) are the flat valley floors and nearly level, older alluvial terraces on the margins of those valley floors (Nilsen et al., 1979).

Slope failure in the Sunol Valley and Niles Canyon region ranges from small, dispersed landslides to vast areas of nearly continuous, large, old landslides susceptible to reactivation. The most extensive areas of large landslides and high hazards are in the upper Alameda Creek and Calaveras Reservoir basins. Within Alameda County, 85 percent of the landslides have been on slopes greater than 15 percent. The canyon walls throughout the reach of Alameda Creek have

[5] The Richter scale is used to measure the relative magnitudes of earthquakes, with 9.0 being the highest or strongest earthquake possible. A 7.0 earthquake is capable of causing considerable damage. For reference, the 1989 Loma Prieta earthquake was measured at 7.1.

[6] Seismic creep is relatively slow movement along a fault, as opposed to the sudden movement of an earthquake.

slopes greater than 15 percent and range as high as 45 percent. Rainfall is typically a major factor in slope failure. Short, intense periods of rainfall have a greater impact with respect to slope failure than annual mean rainfall figures (USGS, 1976).

Seismic Hazards

The two project sites are not located on any major active fault traces. The nearest faults to the project sites are the Calaveras and Hayward faults. Sunol Dam is about 1.5 miles, and the Niles Dam about 4 miles, west of the Calaveras fault. Sunol Dam is about 2.4 miles, and the Niles Dam about 2.1 miles, east of the Hayward fault.

The maximum seismic event that could affect the project area would be an earthquake with a moment magnitude[7] of 6.8 on the Calaveras fault. An earthquake of this magnitude could cause significant ground shaking at either dam location, triggering landslides that might not otherwise occur until a later time. Strong ground shaking can destabilize the toe of the slope, which helps support the weight of material above. Once this support is compromised, there is the potential for slope failure and subsequent landsliding.

Liquefaction is a phenomenon whereby unconsolidated and/or near-saturated soils lose cohesion and are converted to a fluid state as a result of severe vibratory motion. The relatively rapid loss of soil shear strength during strong earthquake shaking results in temporary, fluid-like behavior of the soil. Soil liquefaction causes ground failure that can damage roads, pipelines, underground cables, and buildings with shallow foundations. Liquefaction can occur in areas characterized by water-saturated, unconsolidated, cohesionless, granular materials at depths less than 40 feet. Liquefaction potential is greatest among sandy grain-sized materials, as opposed to smaller silt-size or larger gravel-sized materials.

Regulatory Framework

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the state geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a Seismic Hazard Zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. The project site is located within a Seismic Hazard Zone for landslides and liquefaction, as designated by the California Geological Survey. Although the project does not include development of any structures, this act provides a context for determining the potential impact of the seismic hazards discussed below.

[7] Moment magnitude is an earthquake measurement that relates to the size of fault rupture and movement across the fault.

Impacts

Significance Criteria

The City of San Francisco has not formally adopted significance standards for geology and seismicity impacts, but generally considers that implementation of the proposed project would have a significant geologic or seismic impact if it were to:

- Expose people or property to geologic hazards, such as earthquakes, landslides, mudslides, ground failure, or similar hazards;
- Cause substantial erosion or siltation;
- Substantially change topography or ground surface relief features; or
- Substantially modify any unique geological or physical features.

Impact Analysis

The proposed project would remove two dam structures and does not include grading (except for temporary access) or construction of any permanent structures. Therefore, potential geologic and seismic impacts are primarily associated with changes to the physical environment caused by removing the structures and leaving the stored sediments behind the dams in place. Although earthquakes are unavoidable and would continue to affect the project area, removal of the dam structures would eliminate the potential for structural damage and subsequent injury to people from a sudden earthquake-induced dam failure. However, earthquake ground shaking could result in the failure of unengineered slopes or unconsolidated sediments.

Seismic hazards include the potential for ground surface rupture and secondary effects such as liquefaction and induced slope failures. Hazards due to ground rupture are primarily considered a risk along traces of active and potentially active faults. The project sites would experience ground shaking, but because they are relatively far from the active fault traces most susceptible to surface displacement, the potential for fault rupture is negligible.

The project site is located within a liquefaction and landslide Seismic Hazard Zone. The proposed project does not involve the development of any structures, and therefore the Seismic Hazards Mapping Act does not directly apply to the project. However, the potential impacts from these and other seismic hazards are discussed below.

Aggregate mineral resources have been identified within the watershed lands of the Sunol Valley. MRZ-2 classifications are restricted to portions of Sunol Valley (Stinson et al., 1983). However, no gravel mining operations have occurred near the Sunol or Niles Dams. The project does not propose a particular end use of the project site following dam removal that would restrict future extraction of aggregate resources. Therefore, mineral resources are not discussed further in this document.

Removal of the dams would expose the stored sediment behind the dams (estimated to be approximately 39,200 cubic yards [cy] combined), therefore subjecting it to long-term erosion. Eroded sediment would then be transported naturally to downstream reaches.

Five distinct storage features found on the creek are capable of increasing their storage capacity to absorb this increased load without substantially changing the geomorphology of the creek. These storage features—the creek banks, levees, sandbars, floodplains, and creekbed—would regulate the flow of sediment transport downstream. Over the long term (defined for this purpose as 100 years or more), these sediments would eventually reach the Alameda County Flood Control Channel; however, historical records of sediment removal in the channel indicate that a majority of the sediment load carried by Alameda Creek passes through the channel (Weiss Associates, 2004). In addition, the volume of sediment behind each dam is relatively small compared to the total volume of sediment currently transported by the creek, which has been estimated at 160,000 cy annually. Therefore, the potential impact is less than significant.

Dam removal would create an imbalance in the hydraulic head (i.e., the elevation of the water in the creek) across the former dam structures. Following dam removal, natural processes would cause erosion and incision of the creekbed upstream of the dams until the grades or elevations along the creek match the relative grade of the rest of the creek. This process, called "head-cutting," deepens a stream channel through erosion. As a result, head-cutting could cause increased transport of sediment downstream and alter the natural morphology of the creekbed downstream.

Following dam removal, the creek would likely incise the impounded sediments behind the dam. If this process continued beyond the impounded sediments and into pre-dam sediments, it would flatten out the gradient behind the dam and potentially alter the pre-existing geomorphology of the creek upstream.

The overall gradient of Alameda Creek has been estimated at 0.004 feet per foot. After removal of the dams, it is unlikely that incision would extend upstream to the confluence of Arroyo de la Laguna; in order for this to occur, a reduction in gradient behind the dam would have to approach 0.002 feet per foot, approximately half of the existing gradient, which is considered an unlikely scenario (Weiss Associates, 2004). In addition, the proposed project would leave a remnant of the dam crest at an elevation estimated to be at the pre-dam elevation. In so doing, this remaining structure, coupled with the observed bedrock outcropping exposed in the creek approximately 1,000 feet downstream of Sunol Dam, would act as control points, thus limiting the potential for channel incision to reduce the gradient. Therefore, the potential impact is less than significant.

The reduction of the creek water elevation behind the dams following the transport of stored sediments could cause bank destabilization in Alameda Creek. As noted above, removal of the dams would cause a lowering of the hydraulic head immediately upstream of the dams, which would expose currently saturated soils along the creek banks to potential erosion and destabilization. However, these soils would likely be exposed over a period of years (Weiss Associates, 2004). This rate would provide ample time for the creek banks to reach stabilization,

with only minor sloughing (i.e., relatively small-scale slope failure) that would be within the range of existing creek conditions. This is a less-than-significant impact.

Demolition of the dams and related activities could result in temporary erosion, loss of soil resources, and sedimentation in Alameda Creek. Project activities would include use of heavy equipment that would need to be maneuvered around the dam structures to deconstruct and remove the rubble and debris from the area. Soil compaction, soil disturbance, and downstream sedimentation could occur as a result of these activities, which could increase surface runoff and erosion. This is a potentially significant but mitigable impact. Implementation by the SFPUC of Mitigation Measure E-1, which would require adopting best management practices (BMPs) to minimize the erosion potential, would reduce these impacts to a less-than-significant level.

During initial site activity, heavy rainfall runoff from newly disturbed or stockpiled soil could cause erosional gullies, which could lead to localized slope failures at the edge of the stockpile or disturbed area. These temporary impacts would not result in substantial, adverse, long-term effects such as property loss, injury, or death. This is a potentially significant but mitigable impact. Implementation by the SFPUC of Mitigation Measure E-1, which would require adopting BMPs (including appropriate stockpile protection), would reduce these impacts to a less-than-significant level.

Removal of the dams could affect local slope stability where the abutments anchor to the embankments. The abutments of the dams currently provide localized slope stability and, if removed, could expose these areas to erosion and landslides. The Sunol Dam abutments on either side of the dam are located along relatively steep embankments. In addition, the dam has been in existence long enough to have acquired a certain amount of overburden pressure[8] which, if released, could result in destabilization of material upslope from the abutment. If destabilized, the embankment could fail and result in increased sediment load into the creek, and possibly flooding if the landslide or debris flow were large enough to alter creek flow.

The Niles Dam abutments are smaller than those at Sunol Dam, and only the right abutment (facing downstream) is located on a significant slope. The right abutment is also adjacent to SR 84 (Niles Canyon Road). The dam predates the road and therefore could be providing some structural support of the road in the immediate vicinity of the abutment. Removal of this abutment could result in instability of and potential damage to the road.

For Sunol Dam, the SFPUC would leave enough of both abutments to ensure structural integrity. Special consideration would be given to the bedrock integrity above the left abutment. In the case of Niles Dam, the left abutment might be entirely removed and the right abutment partially left in place to provide sufficient stability to protect the integrity of SR 84. This is a potentially significant but mitigable impact. Implementation by the SFPUC of Mitigation Measure E-2, which would require the SFPUC to develop a geotechnical engineering evaluation of slope stability at the abutments, would reduce these impacts to a less-than-significant level.

[8] "Overburden pressure" refers to the pressure exerted by materials due to gravitational forces.

In the event that a strong earthquake occurs after the dam is removed and before the accumulated sediments have redeposited naturally downstream, the ground shaking could dislodge or liquefy sediments, causing a sudden pulse of sediment to be transported downstream. Such an occurrence would contribute to a short-term increase in sediment load and turbidity beyond that expected under static conditions.

The amount of sediment stored behind Niles Dam, the farthest downstream dam and closest to the flood control channel, is estimated to be 2,200 cy. The volume of sediments stored behind Sunol Dam, the farthest upstream dam from the channel, is estimated to be 37,000 cy. Both dams are located in a region that will likely experience a significant seismic event within the next 30 years. The impounded sediments behind both dams consist largely of saturated, unconsolidated, loose materials that could be susceptible to liquefaction during a significant seismic event, resulting in an increase in the downstream movement of sediment. Even if liquefaction did not occur, ground shaking could initiate down-slope creep (i.e., the slow movement of material under gravitational stresses).

Liquefaction occurs in saturated sediments of uniform size. The majority of the sediment behind the dams, however, has been characterized primarily as gravels mixed with sands. Because liquefaction typically occurs in sediment deposits with uniform particles, the mixture of sand and gravel is less likely to liquefy under ground shaking conditions. However, as discussed above, the volume of sediment stored behind the dams is relatively insignificant compared to the total volume of sediment that is currently transported by the creek. The amount of sediment released by seismically induced ground failure, although more sudden, would not be substantially higher than the amount typically transported down the creek. Further, the existing storage features of the creek would provide a buffer against any significant pulsation of sediment downstream. Therefore, the potential impact from any increased sediment load downstream would be temporary and less than significant. See Section IV.F, Hydrology, Groundwater, and Water Quality, for further discussion of potential water quality impacts.

As stated above, the removal of the dams would allow for the subsequent downstream transport of stored sediment behind the dams, which would alter the topography of the creekbed as additional material is transported during normal and high flow events. The topography, however, would ultimately return to the natural condition that existed prior to the construction of the dams; as such, the project would result in a less-than-significant impact to the topography of the region.

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F. Hydrology, Groundwater, and Water Quality

This section describes hydrology, groundwater, geomorphology, and water quality in the project area, as well as expected conditions during and after dam removal. The Setting section presents existing conditions with respect to climate, geomorphology, fluvial geomorphology, surface water, groundwater, and water quality in the project area. The Regulatory Framework section describes the pertinent federal, state, and local laws related to hydrology and water quality. The Impacts section defines the significance criteria and presents a discussion of impacts.

Setting

Sunol and Niles Dams are located in the Niles Canyon reach of Alameda Creek in the Alameda Creek watershed. The SFPUC operates a large water supply system in the Alameda Creek watershed, which is collectively known as the Alameda Division. The Alameda Creek watershed encompasses 633 square miles of the Coast Ranges in the southeastern San Francisco Bay Area. The watershed extends from Mount Diablo in the north to Altamont Pass in the east, to Mount Hamilton in the south, and Niles Canyon to the west (see Figure 1). The watershed has several major tributaries, including Alameda Creek, Arroyo de la Laguna, Arroyo del Valle, and Arroyo Mocho, all of which drain through Niles Canyon and the lower reach of Alameda Creek. Much of the upper watershed is managed as public parkland by the East Bay Regional Park District, or protected for water supply by the SFPUC. The lower part of the watershed, downstream of Niles and Sunol Dams, is widely developed and densely populated. Above Sunol and Niles Dams are three major flood control and water supply reservoirs: Calaveras and San Antonio Reservoirs, owned by the SFPUC, and the Del Valle Reservoir, owned and operated by the California Department of Water Resources (DWR).

Downstream of the dams, there are a number of artificial structures on Alameda Creek. Starting from Niles Dam and moving downstream, these structures include:

- A U.S. Geological Survey (USGS) Gaging Station (Niles Gage), including a broad-crested weir, which measures flow in Alameda Creek.
- Alameda County Water District's (ACWD) three inflatable dams, which divert water from Alameda Creek to groundwater recharge pits.
- Alameda County Flood Control and Water Conservation District's (ACFCWCD) 11.1-mile flood control channel, which regulates flood flows on Alameda Creek, approximately eight miles of which is regularly desilted (i.e., sediment is removed). This channel begins about 1.5 miles downstream of Niles Dam and conveys flows to San Francisco Bay.
- The BART weir, which acts to control grade at the BART track crossing.
- Numerous transportation and utility crossings.

Both Sunol Dam and Niles Dam are flow-over structures that do not affect the flow regime of the creek or control downstream flooding. The creek flows over the top of the dams during all

months of the year, and the structures serve only to control grade. Both dams are nonoperating structures in that they lack control mechanisms, and reservoir levels are not artificially fluctuated to manage high flows in the creek.

Hydrology

This section focuses on the fluvial geomorphology[1] and sediment transport characteristics of Alameda Creek in and below Niles Canyon. The information in this section is based largely on three reports:

- *Analysis and Impacts of Dam Removal, Niles and Sunol Dams Alameda Creek, Draft Report*, Trihey & Associates, December 21, 2000.
- *Conceptual Engineering for Removal of Sunol and Niles Dams*, Geomatrix Consultants, June 2004.
- *Channel Geomorphology Study, Niles and Sunol Dam Removal Project*, Weiss Associates, October 2004.

Geomorphology of Alameda Creek

Between the upstream end of the ACFCWCD flood control channel at Niles Junction (approximately 1.5 miles, or 7,600 feet, downstream of Niles Dam) to the confluence of Alameda Creek and Arroyo de la Laguna (4,000 feet upstream of Sunol Dam),[2] Alameda Creek is moderately entrenched,[3] with some reaches that are well-entrenched[4] (Weiss Associates, 2004). The backwater[5] above Sunol Dam is located at the entrance to Niles Canyon. Backwater reduces flow velocity in a creek, leading to the deposition of sediments suspended in the flow. The extent of backwater effects (i.e., the extent to which backwater reduces flow velocity in a creek) and the extent of sedimentation were estimated for both dams based on original bed level at the dam and an approximation of the original slope of the creek above the dams. This methodology yielded a range of estimates for backwater effects, with conservative distance estimates of 2,400 feet for Sunol Dam and 600 feet for Niles Dam (Weiss Associates, 2004).

Niles Canyon is characterized by steep, moderately vegetated hillsides terminating in the canyon floor. State Route (SR) 84 and two railroad lines (Niles Canyon Railroad and Union Pacific Railroad), with their associated artificial embankments and bridges, extend along the canyon floor. Channel gradients range from 0.013 feet per foot (ft/ft) to 0.0025 ft/ft, averaging 0.005 ft/ft over the study reach, with the steepest gradient immediately upstream of Niles Dam (see Figure 13). The main channel bed and overbank of Alameda Creek is broad and deep in reaches.

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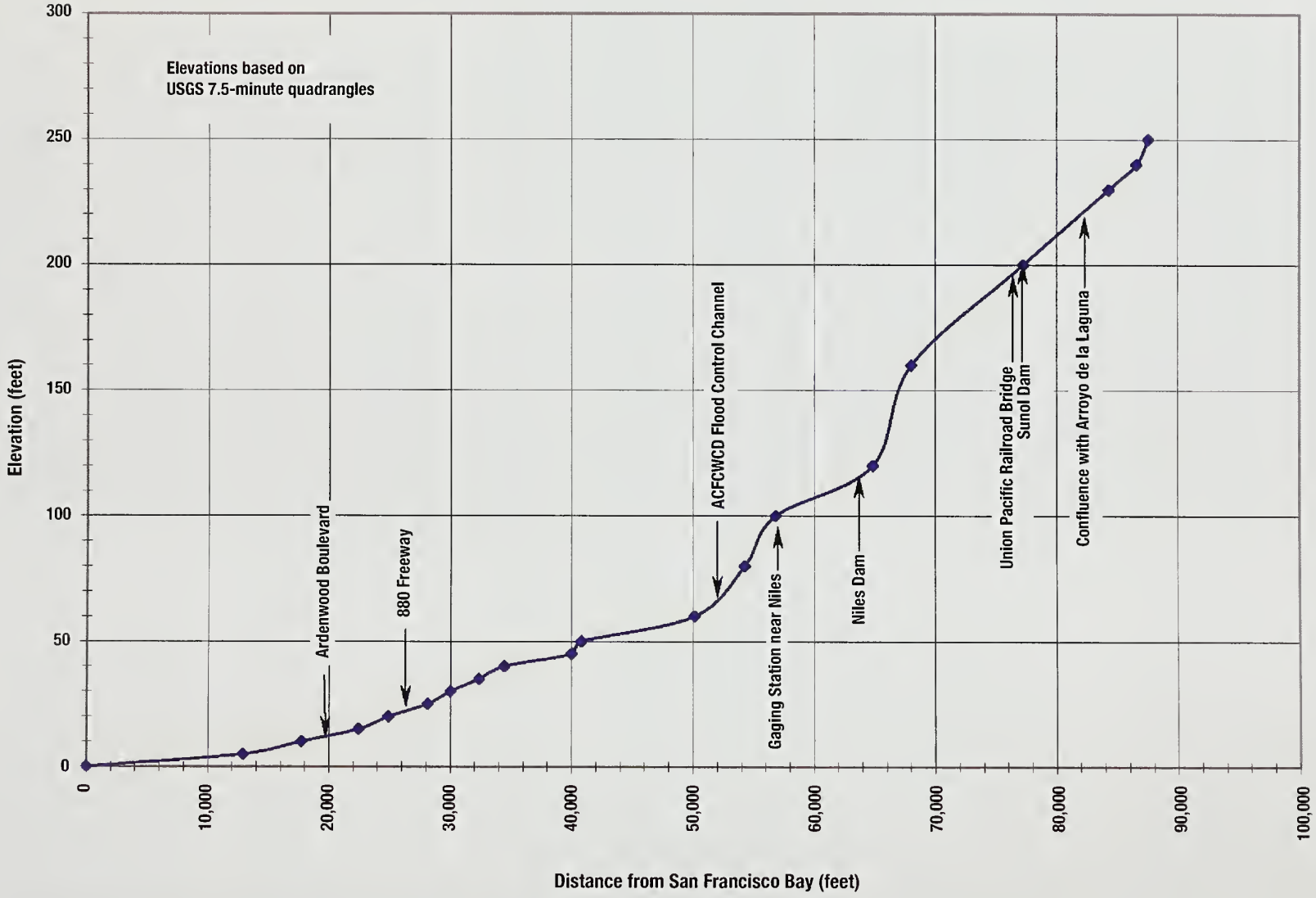
1 Fluvial geomorphology is defined as the study of the change in landform as a result of flowing water, or simply as river forms and processes.
2 This area is known as Niles Canyon.
3 Entrenchment is the degree to which the channel is contained in its valley and is typically measured as the ratio of the width of the floodplain to the width of the bankfull channel.
4 Generally, the more entrenched the channel, the higher the capacity to transport sediment. Conversely, the lower the gradient of the channel, the less capacity it has to transport sediment.
5 A backwater is a body of water created by a dam or other obstruction in a flowing body of water and may also be known as an impoundment.



SOURCE: Weiss Associates, 2004

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Figure 13
Alameda Creek Longitudinal Profile

Alameda Creek has pool, riffle, and run sections, a bed and banks, and gravel bars that contain sand with a mixture of cobbles and boulders. A number of nickpoints[6] occur in the stream profile and are controlled by manmade weirs (one located above Niles Dam and the other located at the USGS gage downstream from Niles Dam) and bedrock outcroppings (Weiss Associates, 2004).

The floodplain, which is constrained by steep hillsides, SR 84, and the railroad, is moderately vegetated with trees and other riparian vegetation and is typically 20 to 200 feet wide. Above Sunol Dam, the backwater floodplain is confined to the south by a steep hillside and to the north by an access berm to the dam.

The flood control channel of Alameda Creek flows through the relatively flat, urban landscape of Fremont, Newark, and Union City. The flood control channel downstream of Niles Canyon has significantly lower grades, with an overall gradient of 0.001 ft/ft. Additional use of Alameda Creek includes ACWD diversions of Alameda Creek flows (augmented upstream by the State Water Project) from the creek downstream of the project area to groundwater recharge pits, which are located adjacent to the flood control channel.

Flow Rates

A USGS Gaging Station referred to as "USGS 11179000, Alameda Creek Near Niles, CA" (Niles Gage) is approximately one mile downstream of Niles Dam. Flow at the Niles Gage results from drainage of the Alameda Creek watershed (see Figure 1). Stream flow data are available from 1891 to 2003 (USGS, 1891 – 2003). Data were analyzed over two time ranges, the full range of complete yearly data available (1892 to 2002) and a range chosen to reflect more recent conditions in the project area (1970 to 2002). Recent conditions reflect development of the reservoir upstream of Niles Canyon. Table 8 presents the results of this analysis.

The flow data show expected seasonal variability between wet and dry seasons, with high flow events in the winter and significantly lower surface flows in the summer. The data also reflect operation of the State Water Project turnout on Vallecitos Creek, a tributary of Arroyo de la Laguna. During the summertime, water is released from the turnout into Vallecitos Creek and eventually flows into Alameda Creek and through Niles Canyon for use by ACWD, which diverts the water downstream of Niles Dam. Flow rate data reveal a marked increase in summer flows under more recent conditions as compared to conditions in the earlier half of the last century, during which time several summer months had average flows of zero.

[6] A nickpoint is an interruption in a stream's longitudinal profile, generally associated with a steep drop in the profile. A waterfall is an extreme example of a nickpoint.

TABLE 8
MONTHLY AVERAGE FLOW RATES – USGS GAGING STATION 11179000 (Niles Gage)

	Average Flow Rate (cubic feet per second)	
	1892 – 2002	1970 – 2002
January	332.8	307.4
February	439.7	486.8
March	334.5	361.7
April	144.0	134.7
May	41.9	58.9
June	22.8	44.4
July	18.4	39.6
August	16.4	38.9
September	14.5	32.7
October	14.4	30.2
November	39.0	60.0
December	121.6	125.5
Average Day	119.9	140.2
Median Day	20.0	41.0
Maximum Day	23,900.0	9,770.0
Average Summer (Aug–Oct)	15.1	33.9
Average Winter (Jan–Mar)	369.0	385.3

SOURCE: Hydroconsult, 2004

Flood Frequency

Table 9 presents a summary of a flood frequency chart developed by Weiss Associates correlating peak flow rates in the Niles Canyon reach of Alameda Creek with the likely yearly recurrence interval.[7] The chart was developed using flow data collected during the period 1970 to 2003.

TABLE 9
FLOOD FREQUENCY – ALAMEDA CREEK, NILES CANYON REACH

Recurrence Interval (Years)	Peak Flow in Alameda Creek (cubic feet per second)
1.25	1,560
1.5	2,000
2.0	4,200
5.0	9,700
10	14,400
25	21,200
50	26,700
100	32,400

SOURCE: Weiss Associates, 2004

[7] The recurrence interval is a guide of how often a certain flow rate is likely to be experienced. For instance, a 100-year flow is expected to occur, on average, once every 100 years.

Sediment

Sediment Sources

Natural drainage has been substantially altered in the watershed that feeds the Niles Canyon reach of Alameda Creek. Three reservoirs—Calaveras (97,000 acre-feet), San Antonio (50,000 acre-feet), and Del Valle (77,000 acre-feet)—lie on the upper reaches of the major creeks contributing to the Niles Canyon reach of Alameda Creek. These reservoirs regulate flow and capture sediment in the upper reaches of the sub-watersheds. The three primary tributaries that contribute flow through Sunol and Niles Dams are Arroyo de la Laguna from the north, San Antonio from the east, and Alameda Creek from the south.

A significant portion of the watershed contains soil described as susceptible to erosion (San Francisco Planning Department, 2000). Erosion is exacerbated in the watershed by a number of factors, including slope failure, channelization, quarry operations, urban development, agricultural cultivation, grazing, road cuts, recreational activities, and wildland fires. Studies by ACFCWCD indicate downcutting of Arroyo de la Laguna and landslides along Alameda Creek in the regional parklands as potentially significant contributors of silt and gravel (Collins, 2003 *in* Alameda Creek Watershed Management Program Steering Committee, 2004.).

Sediment Storage

Sediment is stored in several features in the Niles Canyon reach of Alameda Creek, including natural river levees, banks, bars, the channel bed, and floodplains. The dominant sediments stored are sands and gravels with some cobbles. The floodplain is expected to store the highest volume of sediment, followed by the creekbed. Bars and levees are expected to provide a similar amount of sediment storage to that of the creekbed, although the precise amount of storage is unknown. The floodplain and the banks of the creek are expected to be the most stable storage features; all areas, however, contribute to sediment load during high flow events.

Sediment Loads

Sediment load data from the Niles Gage, located about 0.5 mile upstream of the ACFCWCD flood control channel, were used to estimate annual sediment load in Alameda Creek. Sediment load, or sediment yield, is defined as the total sediment outflow in a stream at a set location over a specified period of time (in this case, analyzed on an annual basis). The sediment load has two components, suspended load and bedload, the sum of which equals the total sediment load. Suspended load is defined as particles that are easily suspended in the flow and travel relatively long distances before settling to the bed. Bedload is the material that is too coarse to be supported by the flowing water for any appreciable amount of time. Bedload grains move by sliding and rolling along the streambed.

Suspended Sediment

Data from the 12 years of suspended sediment sampling at the Niles Gage were analyzed to develop suspended sediment rating curves[8] for both average-day and instantaneous discharge. Flow rates for a 22-year period (1981 to 2003) were used to determine average annual suspended sediment loads. The average annual suspended sediment load was calculated as 256,000 tons per year, and the median annual load was 69,000 tons per year. The difference between average and median is attributed to the influence of large flow events, which disproportionably transport higher suspended sediment loads. When analyzed on a watershed-wide basis, the annual load for Alameda Creek is 404 tons per square mile per year.

Bedload Sediment

The Niles Gage only recently began collecting data on bedload, and an insufficient number of samples are available to establish a bedload rating curve from actual data (Weiss Associates, 2004). Bedload transport equations were therefore used to establish rating curves. Based on these equations, the estimated average annual bedload of Alameda Creek is approximately 13,000 tons per year.

Total Sediment Load

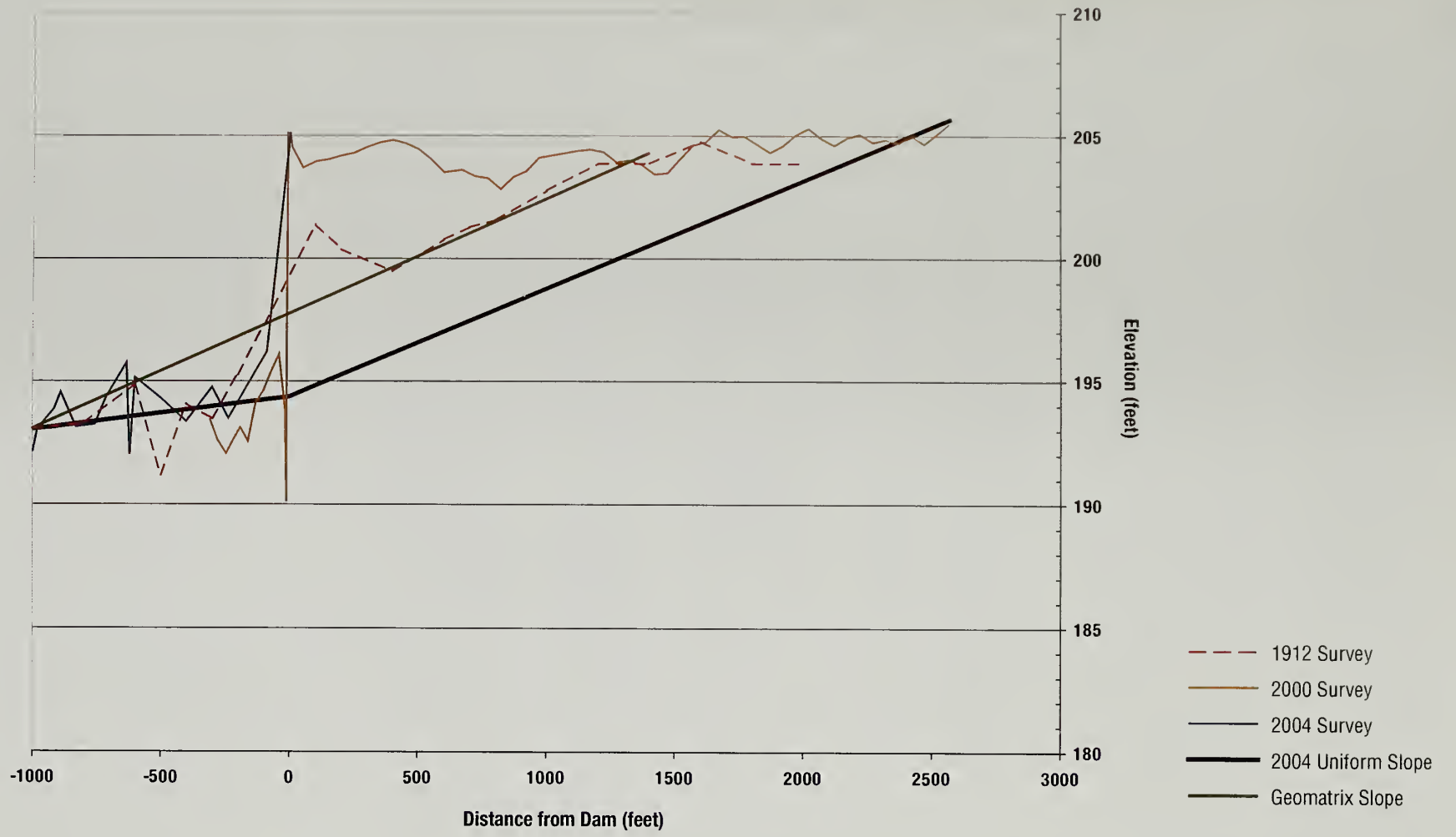
The combination of suspended load and bedload establishes the total sediment load for the creek. The total average load is 269,000 tons per year, total median load is 72,000 tons per year, and the watershed yield is 425 tons per square mile per year.

Sediment Stored in the Dam Impoundments

Assuming an original bed elevation at the dam of 194.4 feet (NGVD 29 datum)[9] and an upstream bed slope of 0.0044 ft/ft (see Figure 14), the estimated volume of sediment stored behind Sunol Dam is 37,000 cubic yards (cy), or 62,200 tons[10] (Weiss Associates, 2004). Assuming an original bed elevation at the dam of 108.4 feet (NGVD 29 datum) and an upstream bed slope of 0.008 ft/ft (see Figure 15), the estimated sediment volume stored behind Niles Dam is 2,200 cy, or 3,700 tons (Weiss Associates, 2004). Thus, the total sediment volume stored behind both Sunol and Niles Dams is estimated at 39,200 cy (65,900 tons).

Previous studies determined particle-size distributions[11] for sediment collected from the impoundments at both dams (Trihey & Associates, 2000). Impounded sediment at Sunol Dam was typically composed of 25 to 33 percent sand (sediment grains between 0.062 and 2 millimeters) and 67 to 75 percent gravel (2 to 64 millimeters). Impounded sediment at Niles Dam was approximately 25 percent sand and 75 percent gravel. Insufficient data are available to

[8] A sediment rating curve establishes a relationship between the mass of sediment transported by the creek and the flow rate in the creek. For instance, Alameda Creek is expected to transport approximately 10 tons per day of suspended sediment past the Niles Gage, for an average daily flow of 12 cubic feet per second.
[9] NGVD is the National Geodetic Vertical Datum established in 1929.
[10] Mass of sediment was estimated based on 1.7 tons per cubic yard of sediment.
[11] Particle-size distribution is a means of classifying the size of individual sediment grains that compose a sediment sample.



SOURCE: Weiss Associates, 2004

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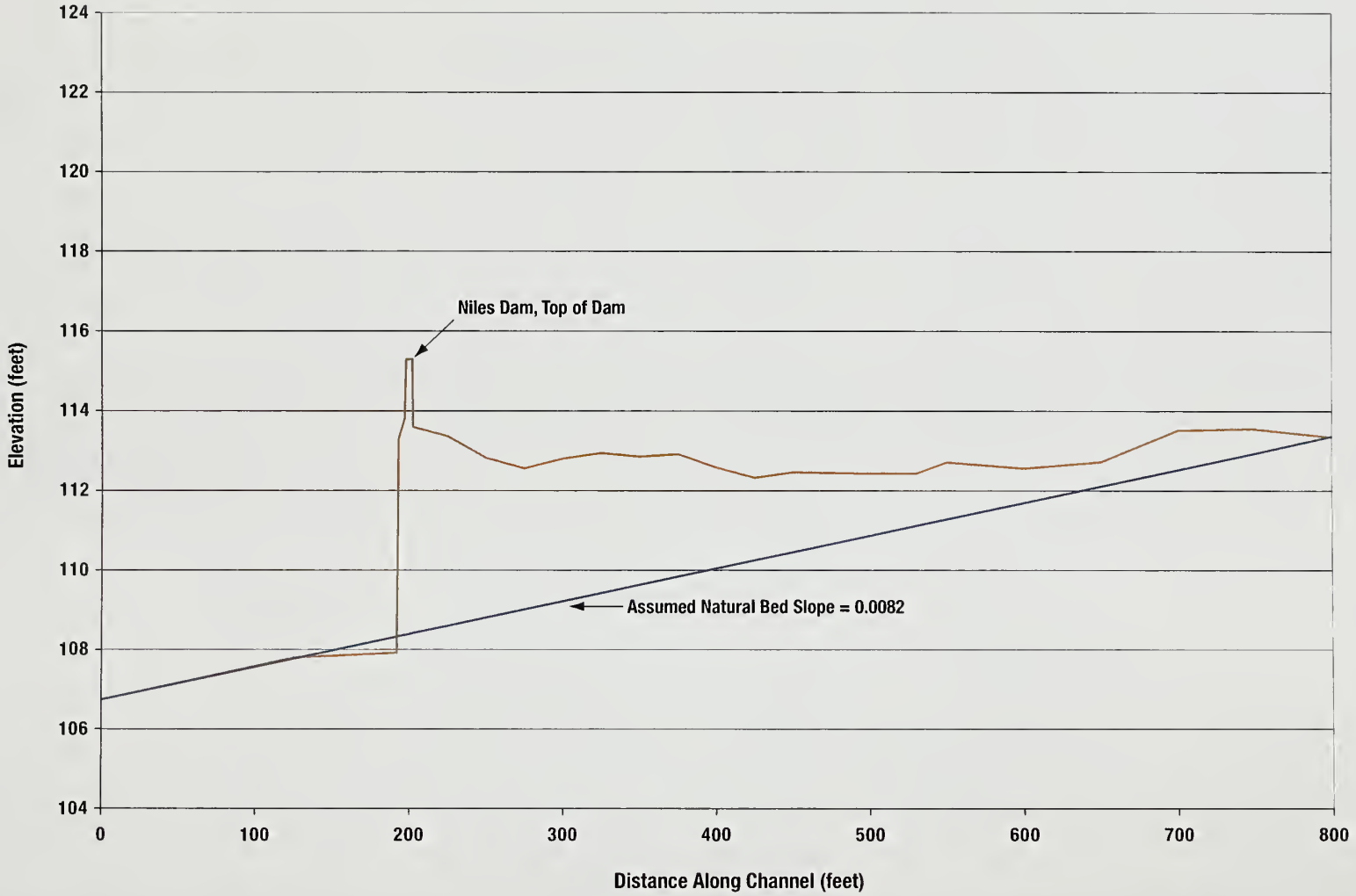
Figure 14
Natural Bed Slope (2004 Uniform Slope)
Through Sunol Dam



SOURCE: Weiss Associates, 2004

Sunol-Niles / 201591 ■

Figure 15
Natural Bed Slope
Through Niles Dam

ascertain if there is substantial variation in typical impounded sediments, either vertically or horizontally (Weiss Associates, 2004). It is unlikely that there is a strong trend in particle-size sorting at either dam site that might result in significantly different proportions of sand and gravel.

Comparison of Annual Sediment Load and Impounded Sediment

The significance of sediment stored behind a dam can be determined by quantifying the annual sediment load in a watercourse and contrasting it with impounded sediment volume estimations (Aspen Institute, 2002). Table 10 presents the annual sediment load in Alameda Creek and conservative estimates of impounded sediment behind Sunol and Niles Dams.

TABLE 10
SUMMARY OF ANNUAL SEDIMENT LOAD IN ALAMEDA CREEK AND ESTIMATED SEDIMENT IMPOUNDMENT AT SUNOL AND NILES DAMS

Annual Sediment Load in Alameda Creek	
Total average load	269,000 tons per year
Total median load	72,000 tons per year
Estimate Sediment Volume Behind Each Dam	
Sunol Dam	62,000 tons
Niles Dam	3,700 tons
Total Impounded	65,900 tons

A comparison of the average annual sediment load of Alameda Creek and the conservative (high) estimate of total impounded sediments indicates that impounded sediments are approximately 25 percent of the average annual sediment load.

According to Weiss Associates (2004), ACFCWCD removed 863,000 cy of sediment from its flood control channel between 1975 and 1999, and the total sediment load of Alameda Creek from the time of construction of the flood control channel in 1965 through 1999 was 4,500,000 cubic yards. Over the long term, therefore, ACFCWCD has removed 19 percent of the sediment load carried by Alameda Creek.

Sediment Quality

Selected samples from seven vibracore sample locations were analyzed for a suite of chemicals, including polychlorinated biphenyls (PCBs), p-nitroanilines (PNAs), pesticides, total petroleum hydrocarbons (TPH), and metals (Geomatrix Consultants, 2004). PCBs, PNAs, pesticides, and TPH as motor oil were not detected in any of the samples. Low levels of TPH as diesel were detected in two samples; however, subsequent laboratory quality control indicated that TPH as diesel was not present. Metals were detected at low levels, at or below accepted background concentrations, with the exception of one detection of nickel, which was just above background. Samples were not analyzed for radioactivity because there is no documentation suggesting the

potential for radioactive materials to be present in sediments behind the dam, except for what occurs naturally in the geologic environment. Laboratory analysis by ACFCWCD and Zone 7 Water Agency indicated that the sediments were nonhazardous, nondesignated waste (Geomatrix Consultants, 2004). Chemical analysis has not been conducted on sediments behind Niles Dam or in the upper reaches of Sunol Dam's backwater.

Regional Geology and Groundwater

Regional Geology

The Alameda Creek watershed generally comprises northwest-trending ridges and intervening valleys, the orientations of which are strongly controlled by the structural grain of the underlying bedrock (refer to Section IV.E, Geology, Soils, and Seismicity). For the purposes of visualizing the groundwater system in the project area, the geologic units can be divided into two main types. The basement (deepest bedrock) is characterized by well-compacted and lithified marine sedimentary rocks (Panoche Formation). These rocks, because of their compact nature, low permeability, and strong structural deformation are considered non-water-bearing, or at best very low water-yielding (Ludhorff and Scalmanini, 1993).

In contrast, the younger surficial deposits are unconsolidated to only slightly compacted. These units are nonmarine, alluvial fan, and stream channel deposits of interbedded gravel, sand, silt, and clay beds. The lower portion of this sequence, the Livermore Gravels, is more consolidated than the upper portion, and is less water-bearing in comparison. The upper coarser-grained sand and gravel beds have high porosity and permeability and are considered water-bearing and high water-yielding. The upper portion, referred to typically as alluvium, is considered to be about 30 to 60 feet thick and is probably the most significant groundwater aquifer in the project area (Luhdorff and Scalmanini, 1993).

Hydrogeology

The primary formation with groundwater development potential in the Sunol Valley is the alluvium (Bookman-Edmonston, 1995). Overall, the alluvium deposits range from the surface to 60 feet below the ground surface. The upper aquifer in the alluvium is "unconfined," meaning that the water table fluctuates in response to recharge (precipitation in the wet season) and discharge (evapotranspiration in the dry season).

Significant alluvial deposits have been removed by gravel mining upstream from Sunol Dam. Historic groundwater observations by quarry operators suggest that the majority of groundwater inflow occurs from the upper alluvium, within about 50 feet of the ground surface (Luhdorff and Scalmanini, 1993). The water-bearing capability of the deeper zone, the Livermore Gravels, is lower than that for the shallow alluvium. The contact between the Livermore Gravels and the shallower zone may be an aquitard (i.e., a semi-impermeable confining layer), which would decrease the potential for recharge of the Livermore Gravels via alluvium and act to partially confine groundwater in the Livermore Gravels (Trihey & Associates, 2000).

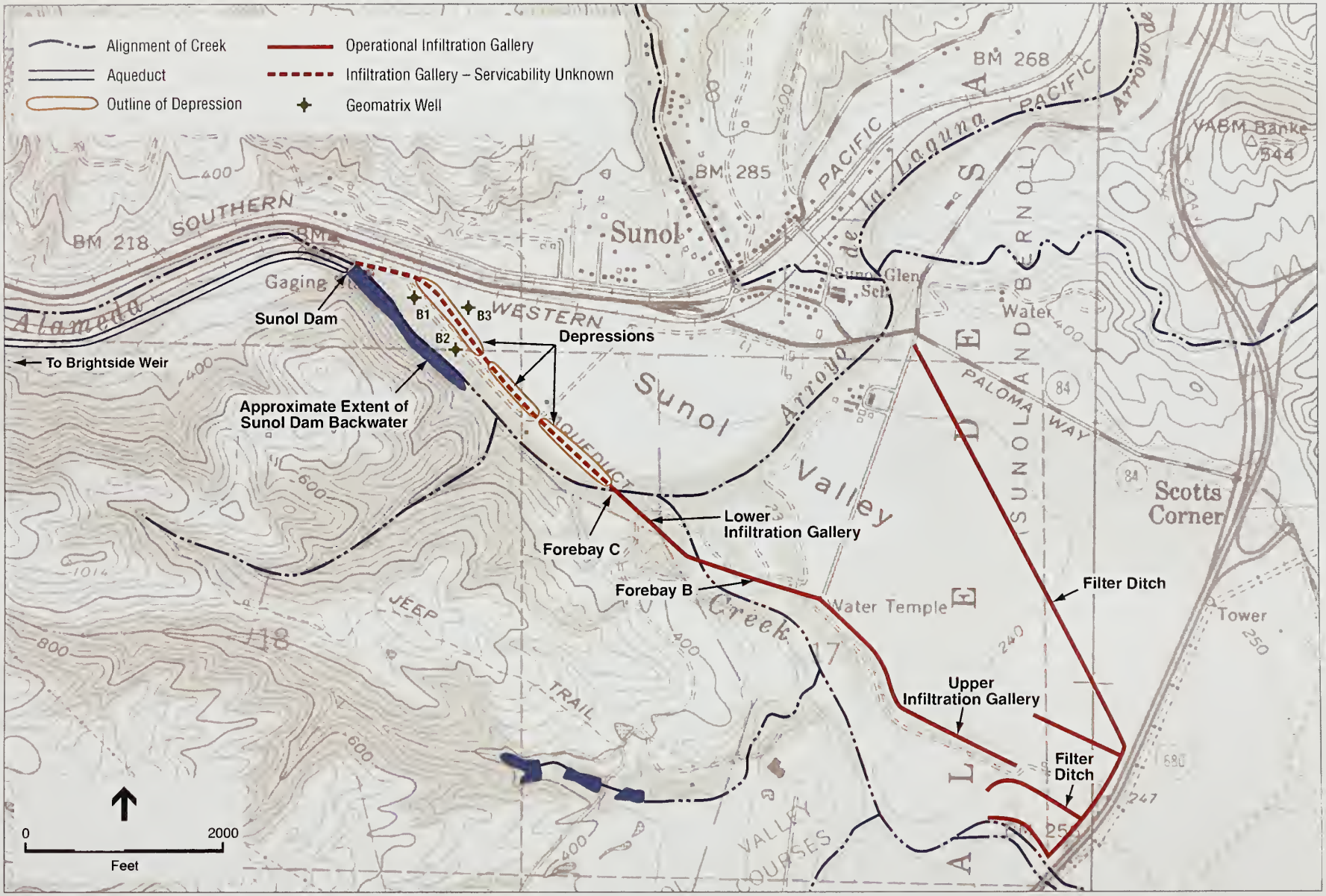
Prior to development, groundwater recharge of Sunol Valley alluvium occurred primarily as seepage from the Alameda Creek stream channel and percolation of direct precipitation. Groundwater levels would have been highest during and just after the rainy season and lowest during summer and until the beginning of the wet season. Discharge from the basin would have consisted primarily of groundwater seepage to the channels of Alameda Creek and Arroyo de la Laguna at the downstream end of the valley (Bookman-Edmonston, 1995). Prior to the construction of the Sunol Dam, which artificially raised the water table, groundwater levels in the downstream end of the valley were lower than those observed today.

Sunol Infiltration Galleries

Sunol Dam was built around 1899 by the Spring Valley Water Company to maintain hydraulic head within the gravel deposits upstream of the dam, adjacent to and underlying the Alameda Creek bed. These gravel deposits host the Sunol infiltration galleries. The infiltration galleries, which are set in the gravel deposits, provide a location for temporary aquifer recharge (deposit) and recovery (withdrawal) (see Figure 16). The infiltration galleries consist of a 8,985-foot-long concrete tunnel, pierced and tapped with screened brass pipes and 38-inch perforated concrete pipes. Surface water from Alameda Creek, particularly peak storm flows, seep into the gravels and are recovered by the infiltration galleries. A series of diversion dams and ditches were historically used to increase yield from the system. The infiltration galleries were not designed to "draw down" groundwater levels; rather, they were designed to intercept surface water from Alameda Creek. In this way, short-duration high flows in Alameda Creek resulting from heavy rainfall events were diverted and temporarily stored before being recovered over a longer time period by the infiltration galleries. Dependable yield from the infiltration galleries is 5 million gallons per day (mgd), but under flood conditions the fully operational galleries could produce up to 20 mgd (SFPUC, 2005).

Groundwater recovered through the upstream portion of the infiltration galleries discharges through the Sunol Water Temple (Bookman-Edmonston, 1995). After being routed to the Water Temple, the collected groundwater is directed to the Sunol Aqueduct, which also serves as an infiltration gallery between the Water Temple and Sunol Dam. The infiltration galleries extend from the Water Temple to the abutment at Sunol Dam, beneath a series of depressions that parallel Alameda Creek (SVWC, 1910) (see Figure 16). At Sunol Dam, the aqueduct is routed through the top of the dam wall to the south side of Alameda Creek before proceeding downstream through Niles Canyon. Brightside Weir, a weir on the Sunol Aqueduct, was designed to control the flow in the aqueduct and is still operational. The weir is located downstream of Sunol Dam. Groundwater that enters the Sunol Aqueduct travels to the Brightside Weir, where a large sump discharges the water into Alameda Creek. Water is no longer conveyed in the aqueduct beyond this point (Trihey & Associates, 2000). The Sunol Pumping Plant, which is adjacent to the Water Temple, is capable of pumping groundwater to San Antonio Reservoir or the Sunol Water Treatment Plant.

The infiltration galleries above the Water Temple and down to Forebay C (see Figure 16) are operational. The status of the infiltration gallery between Forebay C and Sunol Dam, beneath the depressions, is not known. This section of infiltration gallery may be operational, or it may be



SOURCE: Hydroconsult Engineers, Inc., 2005; Maptech USGS base map

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Figure 16
Schematic Showing
Infiltration Gallery Features

fouled and clogged such that very little groundwater infiltrates to the aqueduct. An operational assessment of the Alameda Creek watershed, undertaken in 1912, notes that the infiltration capacity of the gallery between Forebay C and the dam is very low compared to the capacity of the system upstream of Forebay C. The report suggests that the gravels closer to the dam have less infiltration capacity than those upstream and farther into the valley (Williams, 1912).

After 1934, Alameda Creek flows were controlled by Calaveras Reservoir, dramatically decreasing the yield of the infiltration galleries. Recharge to the galleries was further reduced in 1965 when construction of San Antonio Dam eliminated supply from San Antonio Creek. Other than the infiltration galleries, only incidental groundwater development, consisting of a small number of wells for water supply, occurred in the valley until recent times.

Beginning in the late 1960s, gravel mining began altering groundwater flow patterns in the valley. As a result of the quarry operations, groundwater levels in portions of the valley are lower than during the first half of the last century, and flows formerly captured and diverted into the infiltration galleries have decreased in recent years (Bookman-Edmonston, 1995).

The Sunol Valley Golf Course uses local groundwater by drawing water from Brightside Weir on the aqueduct/infiltration gallery immediately downstream of the Water Temple, at Forebay C (see Figure 16) (Milstein, 2005). The golf course can be supplied up to 1 mgd, and occasionally during summer months draws that demand. The SFPUC recently installed a new irrigation supply system for the golf course. This system was designed under the assumption that the dam would be removed, and as such the proposed project would not affect golf course irrigation supply (Lombardi, 2005). In the event the golf course does not require water, the Sunol Pumping Plant diverts most water, at Forebay C, to the San Antonio Reservoir. During summer months, the golf course and/or the Sunol Pumping Plant divert nearly all water at Forebay C from the aqueduct. On these occasions, the flow at Brightside Weir is very low, suggesting that at these times the infiltration gallery between Forebay C and Sunol Dam draws very little water (Meier, 2005). These observations concur with conclusions from the 1912 operational assessment report.

Groundwater at Sunol Dam

Three shallow depressions have been excavated parallel to the access road, approximately 400 feet from the present alignment of Alameda Creek, in alluvial material (see Figure 16). Each depression is longitudinal in shape, approximately 100 feet wide, 15 feet deep, and averages 1,000 feet long. These depressions were likely borrow areas for berms for the road and railroads. The infiltration gallery and Sunol Aqueduct, according to San Francisco Water Department drawing F-342A, are aligned beneath the base of the depressions (SFPUC, 1960).

Anecdotal evidence (Sak, 2005) suggests that the depressions upstream from Sunol Dam, above and along the alignment of the infiltration gallery and adjacent to the backwater of Sunol Dam (Figure 16), hold some water during the wetter months. During the field visit conducted by Hydroconsult Engineers in September 2004, the base of these depressions was dry, though there was evidence of water-tolerant plant life. A one-year record of local groundwater monitoring suggests the base of the depressions is below the upper expected limits of the seasonal

groundwater table. These depressions likely form seasonal wet areas, although extended wet or dry periods may affect the seasonality of the wet areas.

Summary of Historic Groundwater Observations

Available groundwater data for Sunol Valley are limited. Investigations conducted in 1986 by the ACWD and in 1989 by the Mission Valley Rock Company involved the installation of several small-diameter monitoring wells throughout the valley (see Figure 17). Water levels were measured at the time of installation, but since then have not been routinely measured. Luhdorff and Scalmanini measured water levels in existing wells several times in 1992 and 1993. The ground surface elevations of the wells were estimated, by either survey or reference to available topographic maps. Contours of measured groundwater elevations for November 1992 were prepared and are shown on Figure 17.

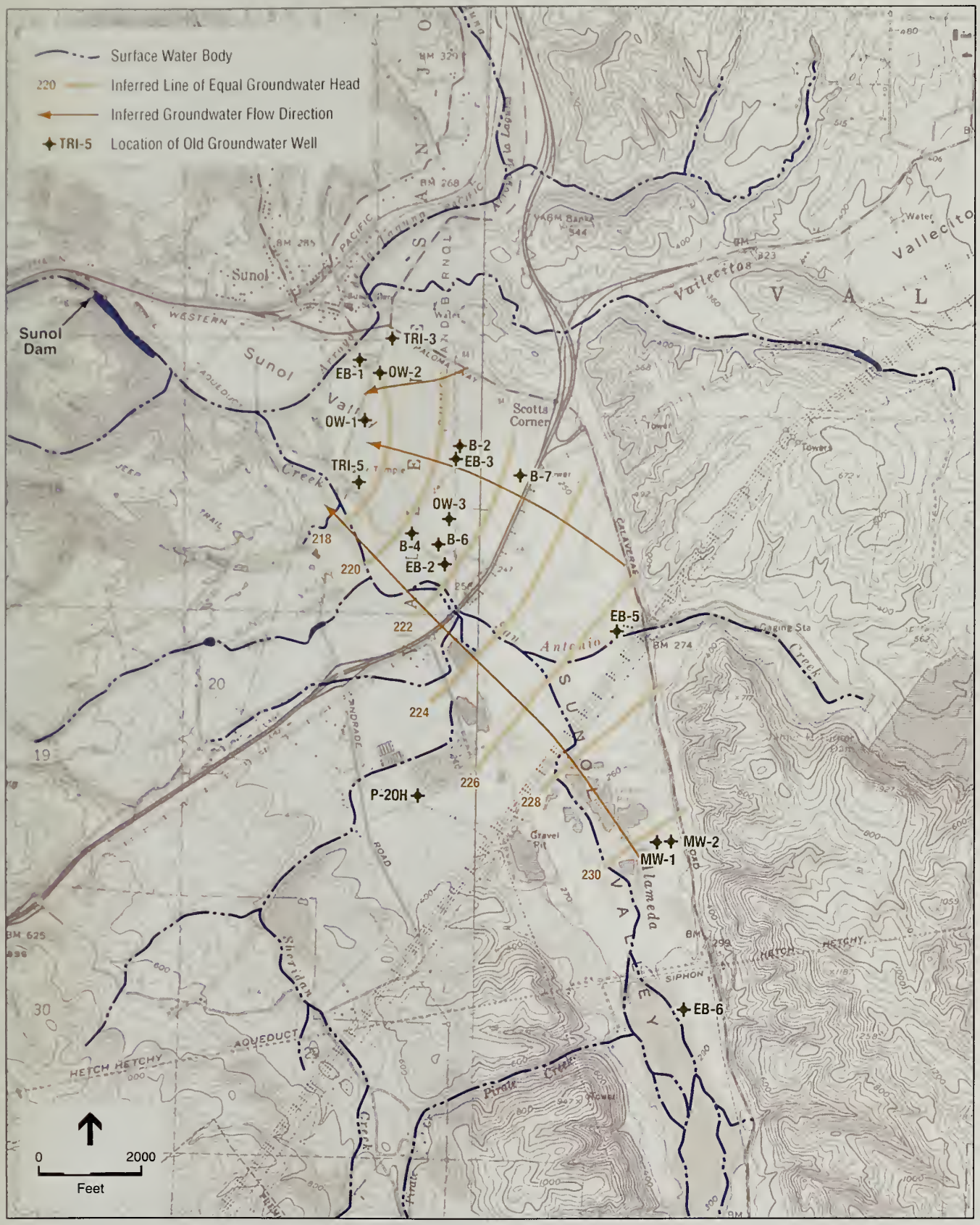
The inferred groundwater level contours, using 1992 data, approximately parallel the ground surface contours of the valley floor, and generally indicate a direction of groundwater flow parallel to Alameda Creek. Groundwater levels are lowest at the northwestern end of the valley, near the Water Temple, and are highest in the southern, upper end of Sunol Valley. Groundwater was thus determined to flow in a northwesterly direction, with a focus at the entrance to Niles Canyon. Luhdorff and Scalmanini concluded that the generally sparse grid of well measurements did not allow assessment of groundwater levels near the gravel quarries or Sunol Dam.

Luhdorff and Scalmanini (1993) used the limited data to assess seasonal fluctuations in groundwater levels. Generally, comparison of seasonally collected water levels showed relatively small variations from spring to fall. Luhdorff and Scalmanini concluded that, overall, groundwater levels in Sunol Valley range from 20 to 30 feet below ground surface, with probable localized depressions around gravel quarries.

Recent Investigations and Data

In April 2004, Geomatrix Consultants installed three shallow groundwater monitoring wells near Sunol Dam (see Figure 16 for approximate locations). The wells were installed on either side of the infiltration gallery between Forebay C and Sunol Dam. The objective of the well installation and monitoring was to better understand the interrelationship of groundwater levels and surface water levels at the dam to the presence of water in depressions adjacent to the infiltration gallery/aqueduct and access road, as well as to monitor seasonal fluctuations on the north side of Alameda Creek.

The monitoring wells were advanced into the shallow alluvium deposits to an approximate depth of 25 feet below ground surface. Groundwater levels were measured in the wells and Alameda Creek above Sunol Dam between April 2004 and April 2005. Groundwater contours for October 2004 are plotted on Figures 18a and 18b, which shows contours of equal groundwater head and inferred flow directions.



SOURCE: Hydroconsult Engineers, Inc., 2005;
Adapted from Luhdorff and Scalmanini, 1993;
Maptech USGS base map

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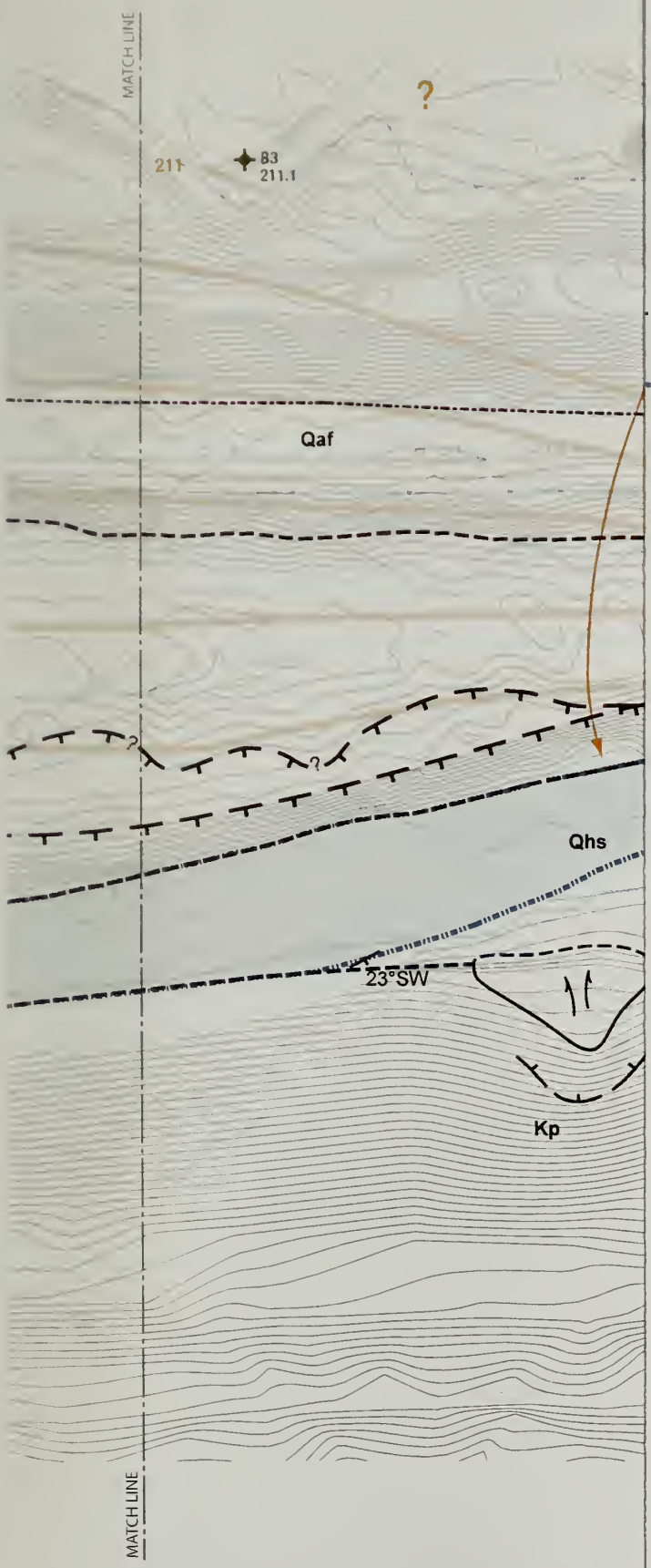
Figure 17

Inferred Groundwater Elevations
and Groundwater Flow Directions
in Shallow Alluvium
November 1992



MAP SYMBOLS

- Erosional scarp, queried where uncertain
- Geologic contact, dashed where approximate, dotted where inferred, queried where uncertain
- Approximate edge of water in Alameda Creek on 1/28/03
- Landslide
- Major topographic contour (interval = 10 feet)
- Minor topographic contour (interval = 1 foot)
- Spring or seep
- Outcrop of bedrock
- 20°SE — Strike and dip of bedding
- 54°SW — Strike and dip of joint/fracture

GEOLOGIC UNITS

Qaf	Artificial fill (Historic)
Qhs	Stream Channel Deposits (Holocene)
Qt	Alluvial Terrace Deposits (Quaternary)
Kp	Panoche Formation, Sandstone and Shale (Cretaceous)

- 220 — Inferred Line of Equal Groundwater Head
- Inferred Groundwater Flow Direction
- B1 208.62 — Geomatrix Well Location and October 25, 2004 Groundwater Level

0 100
Feet

SOURCE: Geomatrix, 2004

NOTE: Base map prepared by MDL & Associates, Inc.
Map projection is State Plane NAD83; Vertical datum is NGVD29.

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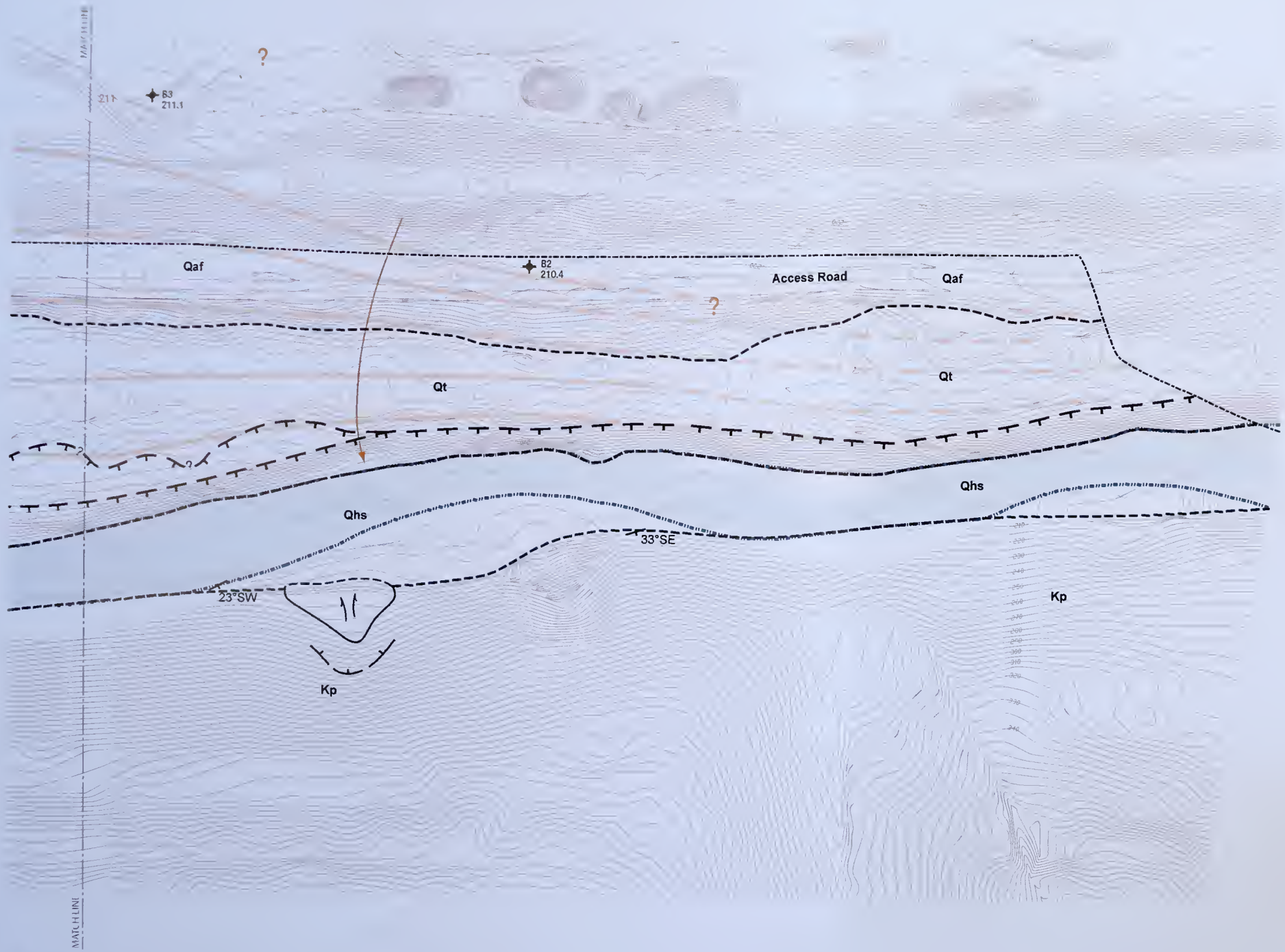
Figure 18a
Geologic and Topographic Map, and Inferred Groundwater Conditions of Sunol Dam Site
October 2004



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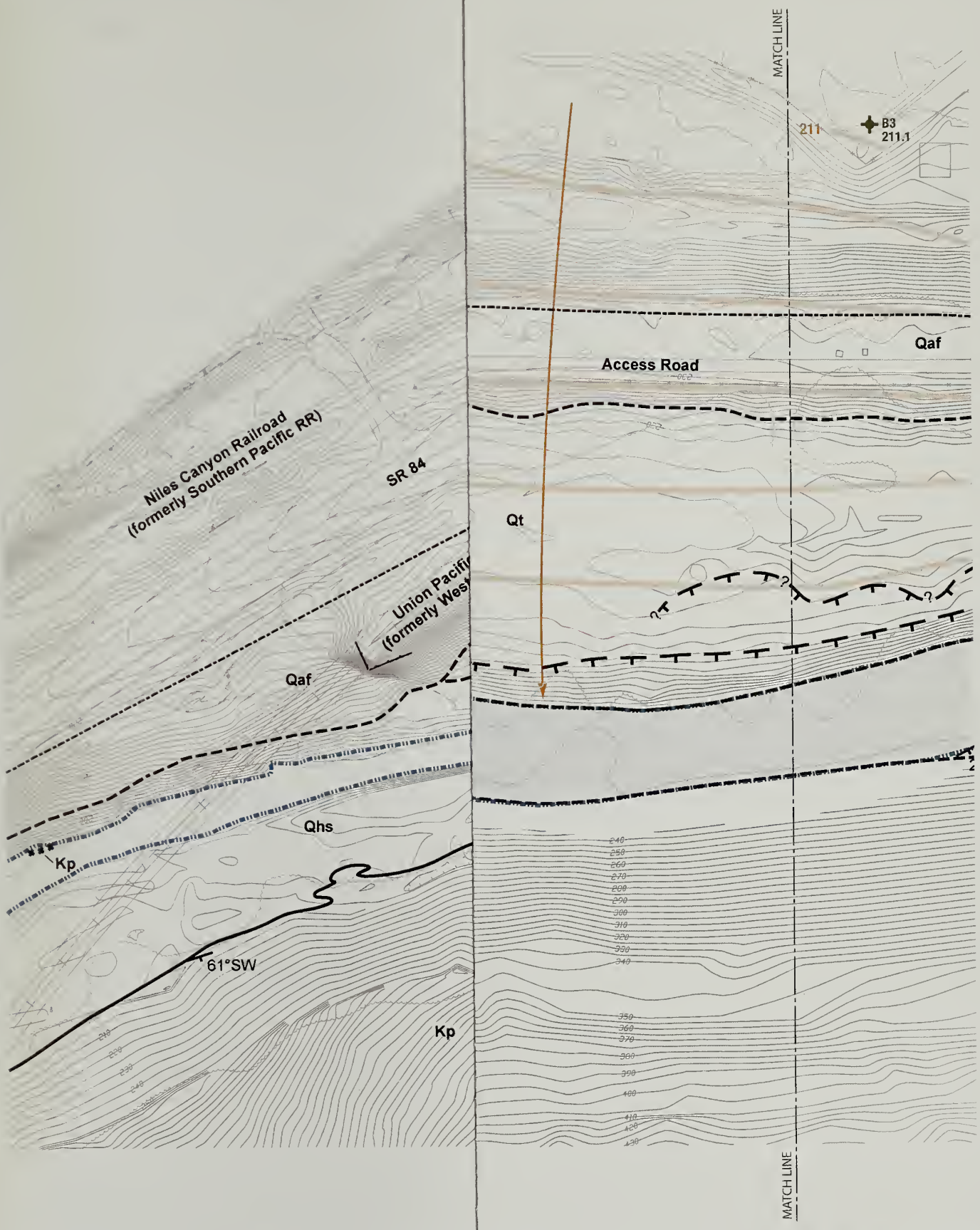
0 100 Feet

SOURCE: Geomatrix, 2004

NOTE: Base map prepared by MDL & Associates, Inc.
Map projection is State Plane NAD83; Vertical datum is NGVD29.

Figure 18a
Geologic and Topographic Map, and Inferred Groundwater Conditions of Sunol Dam Site
October 2004



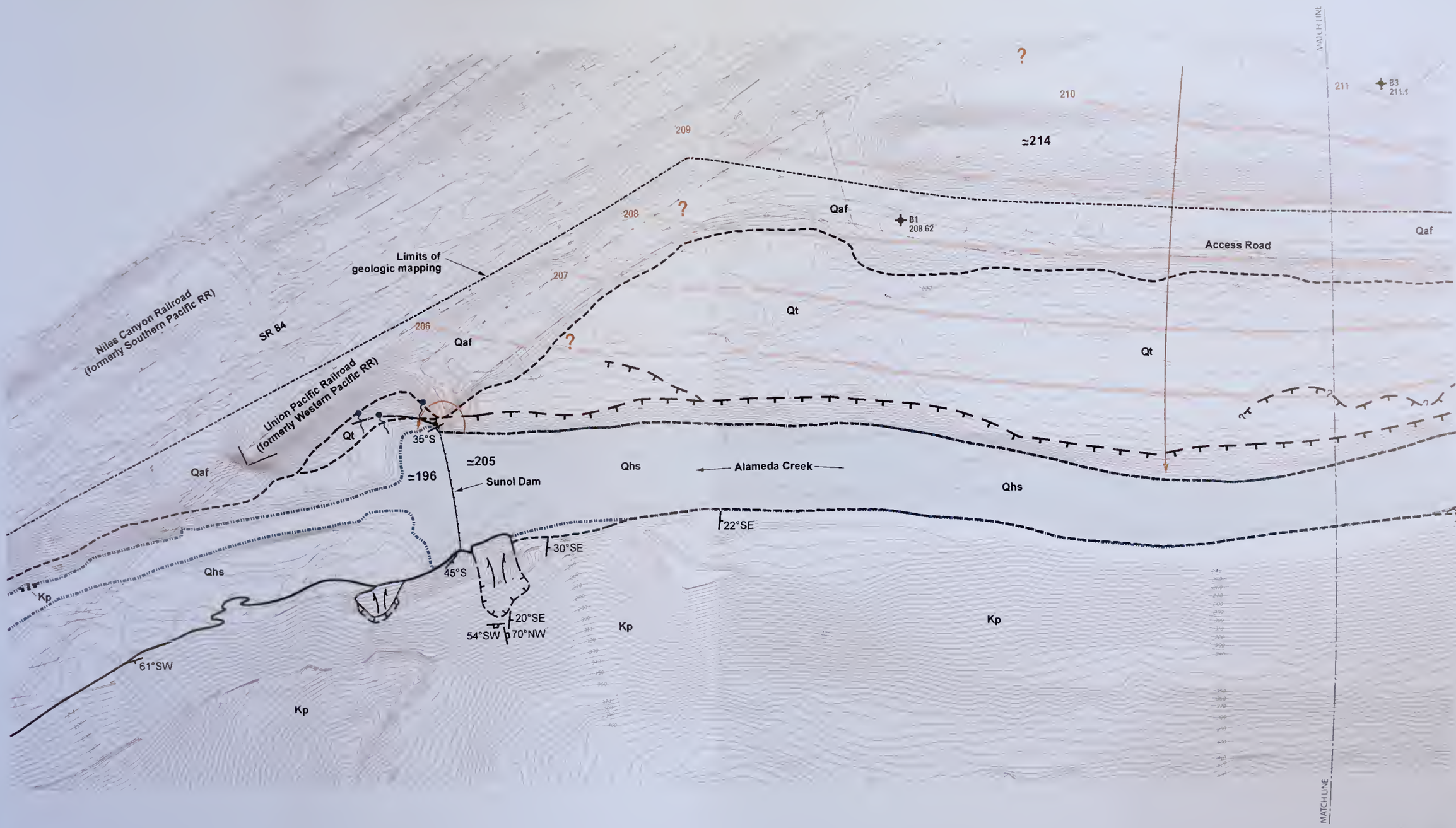
Sunol-Niles / 201591 ■

SOURCE: Geomatrix, 2004

NOTE: Base map prepared by MDL & Associates, Inc.
Map projection is State Plane NAD83; Vertical datum is NGVD29.

Figure 18b

Geologic and Topographic Map,
and Inferred Groundwater Conditions
of Sunol Dam Site
October 2004



SOURCE: Geomatrix, 2004

NOTE: Base map prepared by MDL & Associates, Inc.
Map projection is State Plane NAD83; Vertical datum is NGVD29.

Figure 18b
Geologic and Topographic Map, and Inferred Groundwater Conditions of Sunol Dam Site
October 2004

Sunol Dam artificially raises groundwater levels and also serves as an impermeable barrier that groundwater must flow around. Water stored in Sunol Dam has reached equilibrium with adjacent groundwater; this equilibrium is characterized by a gradual discharge of groundwater to the creek, except for a small zone around the dam abutments.

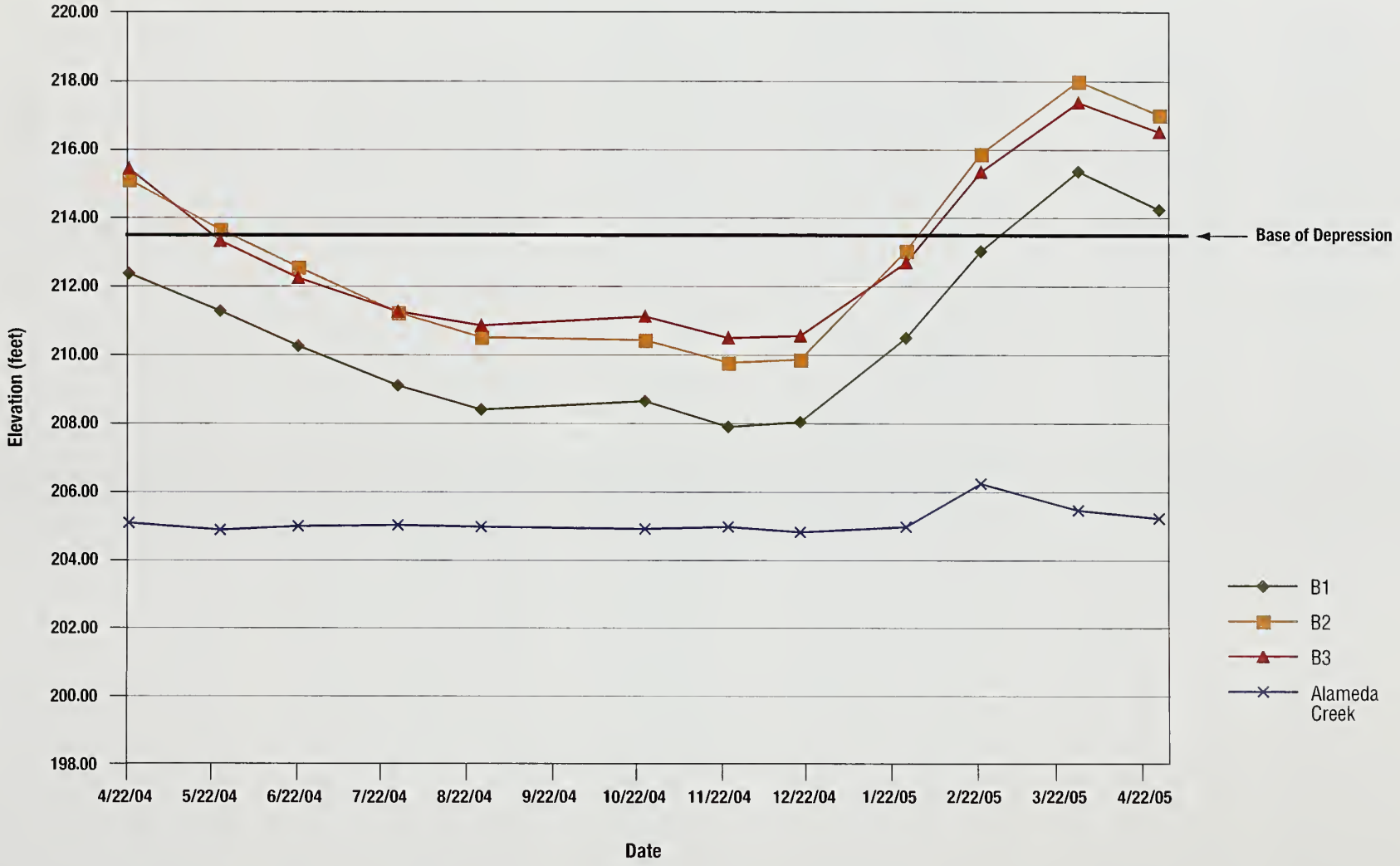
The local groundwater gradient, based on October 2004 groundwater data, is approximately 0.015 ft/ft toward the southwest. An area with steeper gradients exists near the right abutment of the dam wall, where groundwater flows radially from the higher impound level to the lower Alameda Creek level on the downstream side of the dam. The inferred groundwater flow direction is shown on Figures 18a and 18b.

The base of the depressions adjacent to the access road, some 400 feet from Alameda Creek, is approximately 214 feet NGVD 29 (see Figure 19). This suggests that the infiltration gallery along the base of the depressions is set somewhere between 200 and 212 feet. Groundwater monitoring data at the three wells have been collected since April 2004 (see Figure 19). Both April and May 2004 groundwater levels, as well as February and March 2005 levels, indicate that the depressions likely intersected the water table (i.e., are below the prevailing water table), as well as impounded standing surface water. Groundwater levels between June 2004 and January 2005 indicate that the base of the depressions were above the prevailing water table (Hydroconsult, 2004).

The data shown on Figure 19 indicate a steady decline in groundwater levels adjacent to Sunol Dam (approximately 300 feet from the dam) over the summer months (a 5-foot decline in six months). Based on one complete water year's worth of groundwater level monitoring, the lowest recorded groundwater levels occurred in November, and the highest levels were recorded in March.

The data suggest that the local groundwater system seasonally inundates the depressions. The operational capacity of the infiltration gallery beneath the depressions is uncertain, although a 1912 operational assessment report suggests that this length of the gallery did not infiltrate a large quantity of water; according to the report, the majority of infiltration was observed upstream of Forebay C (Williams, 1912). The monitoring data as well as discussions with SFPUC staff suggest that the galleries are not intercepting the majority of groundwater along this reach during the wetter months and may be partially to almost completely blocked to groundwater, possibly a result of clogging or fouling of the infiltration gallery openings (Meier, 2005).

The shallow depressions also intercept a small amount of surface water, mostly incidental rainfall. Some small-diameter PVC pipework was observed in the base of one depression during Hydroconsult Engineers' site visit. The pipe could not be traced, but was aligned toward a pond on the adjacent nursery property. It is possible that the pipe acts as an overflow for the pond, in which case the depression may receive water from offsite when the adjacent pond overflows. By November 2004, groundwater levels had begun to stabilize at their expected lows for the water year; in response to the increased recharge of the wetter months, groundwater levels would likely continue to rise, as evidenced by December 2004 through March 2005 groundwater level monitoring data.



SOURCE: Hydroconsult Engineers, Inc., 2005

Sunol-Niles / 201591 ■

Figure 19

Groundwater and Surface Water Elevations, Sunol Dam

The range of groundwater levels depicted on Figure 19 most likely represents the typical seasonal extent of groundwater fluctuation within the vicinity of each well, which is between 5 and 6 feet. According to Luhdorff and Scalmanini, there were insufficient data to develop firm conclusions, but most data suggest the presence of small seasonal (spring to fall) fluctuations in water table elevation. The observed data from the Geomatrix Consultants wells confirm the Luhdorff and Scalmanini assessment.

Groundwater contours from 1992 for the broader Sunol Valley (see Figure 17) and inferred contours from October 2004 in the vicinity of Sunol Dam (see Figures 18a and 18b) have been collated into a single depiction of typical groundwater conditions between I-680 (see Figure 20) and the entrance to Niles Canyon. Groundwater flows to the northwest, from the upper limits of the valley (not shown on Figure 20), and gradually sweeps to a southwest flow direction in the immediate vicinity of Sunol Dam.

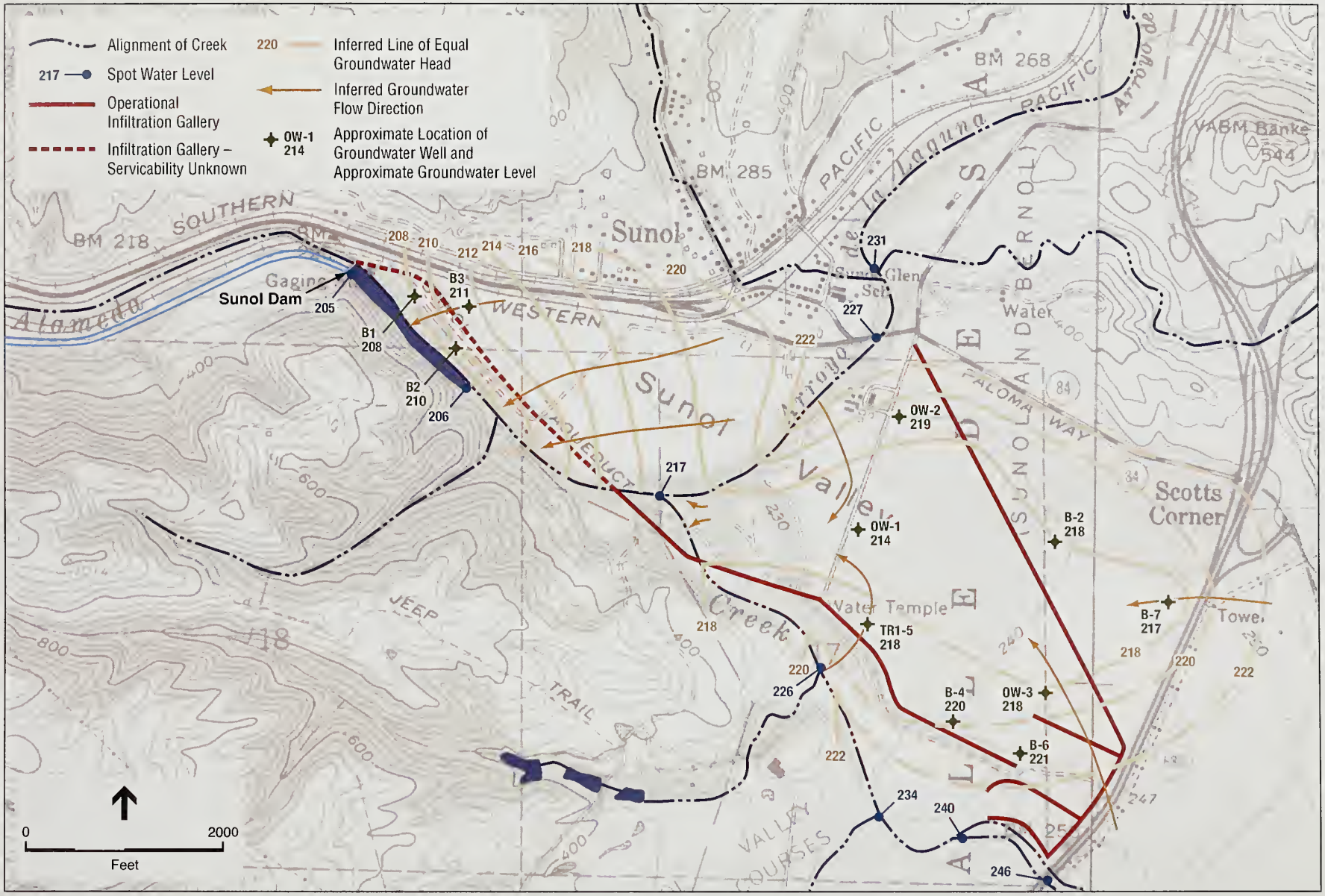
As shown on Figure 20, the presence and flow direction of groundwater is complicated by the infiltration galleries, stream confluences, and Sunol Dam. Interpretation of conditions is difficult due to a paucity of data, and this depiction is only an estimate of actual conditions.

The Water Temple and a portion of the infiltration galleries are located upgradient of Arroyo de la Laguna (the south side) and Alameda Creek (the east side) in an area bounded by Paloma Way and I-680. Review of drawings and reports suggests that the infiltration galleries are set at an approximate elevation of 210 to 220 feet, though between Forebay C and Sunol Dam the likely elevation is 200 to 212 feet.[12] As mentioned, it is suspected that the infiltration galleries between Forebay C and Sunol Dam are not operating at capacity. The approximate location of the galleries is shown on Figure 20.

Comparison of ground surface contour values with the inferred water table surface suggests that Alameda Creek is a "losing" waterway for the majority of its course through Sunol Valley (i.e., water from Alameda Creek recharges the groundwater table via infiltration through the streambed). However, in the vicinity of the confluence between Arroyo de la Laguna and Alameda Creek, at approximately 217 feet mean sea level (msl), this recharge relationship reverses, with groundwater beginning to contribute to Alameda Creek flow. This portion of Alameda Creek is thus classified as a "gaining" stream. By Sunol Dam, as shown on Figure 20, groundwater to creek discharge is well established.

Delineating an accurate extent of elevated groundwater levels due to the presence of the dam is difficult. However, limits on the extent of influence can be inferred from topographic and waterway maps, local geology, and site inspections. Sunol Dam acts to restrict shallow

[12] Utilities Engineering Bureau, *Structural Survey and Evaluation for Sunol and Pulgas Water Temples*, Conceptual Engineering Report (W-061), November 1990. San Francisco Water Department, Drawing No. E-2791, *Rehabilitation of Sunol Water Temple*, March 1962. San Francisco Water Department, Drawing No. F-342A, *Niles Canyon Properties Sunol Portion*, May 1960. Spring Valley Water Company, Drawing No. F-58, *Sunol Filter Beds Showing Pipes Galleries and Ditches*, August 1910. Spring Valley Water Company, Drawing No. E-32, *Sunol Filter Beds Showing Pipes Galleries and Ditches*, May 1910. San Francisco Water Department, Drawing No. E-3598, *Contour Map Proposed Pump Station at Sunol Water Temple*, March 1965.



SOURCE: Hydroconsult Engineers, Inc., 2005; Maptech USGS base map

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Figure 20

Composite Inferred Groundwater Contours, Sunol Valley

groundwater flow at the head of the valley. The dam spillway is currently at an elevation of approximately 204.4 feet, while the best estimate for the original bed, and the proposed final elevation after the dam removal, is approximately 194.4 feet; thus, Sunol Dam raises the hydraulic head in Alameda Creek by about 10 feet. This hydraulic head, represented by the surface impoundment, raises the groundwater head in the vicinity of the dam. The backwater from Sunol Dam is inferred to be 2,400 feet (Weiss Associates, 2004).

The confluence between Arroyo de la Laguna and Alameda Creek can be used as a groundwater level control point. Both streams flow year-round, and the proximity of surface grades to the water table in the vicinity suggests there is a direct connection between surface water and groundwater at the confluence. For this interpretation, groundwater in the immediate vicinity of the confluence has been set at a level of 217 feet, equal to the surface water elevation at the confluence. From the confluence, Alameda Creek continues upstream to the southeast and toward the Water Temple, while Arroyo de la Laguna continues upstream toward the northeast (see Figure 20).

As shown on Figure 20, groundwater in the northwesternmost portion of Sunol Valley is recharged to a large degree by flow from the Arroyo de la Laguna. Arroyo de la Laguna, as it crosses Sunol Valley on its way to the confluence with Alameda Creek, recharges the general groundwater table to the northwest, and the general groundwater table and the infiltration galleries to the southeast. In this capacity, Arroyo de la Laguna has the potential to act as an intermediate sub-groundwater divide.

The important conclusions to draw from this interpretation of groundwater conditions are:

- Sunol Dam artificially raises groundwater levels by approximately 10 feet in the immediate vicinity of the dam; this effect diminishes moving away from the dam.
- During operations, the infiltration galleries upstream of the Water Temple primarily relied on surface water diversion from Alameda Creek and Laguna Creek; the infiltration galleries between the Water Temple and Forebay B primarily relied on recharge directly from Alameda Creek and to some degree Laguna Creek; and the infiltration gallery between Forebay B and Sunol Dam primarily relied on Sunol Dam to provide recharge.
- The major influence of the dam on groundwater is restricted to the area between Sunol Dam and the confluence of Alameda Creek with Arroyo de la Laguna.

Groundwater at Niles Dam

Like conditions at Sunol Dam, the local hydrogeology at Niles Dam is best envisioned as occurring in two separate and distinct geological units. The broader, and from a resource perspective, lesser aquifer is contained within the Panoche Formation bedrock. The other aquifer is hosted in alluvial deposits immediately beneath and adjacent to Alameda Creek. The alluvial deposits form the floodplain adjacent to the creek; however, the floodplain is limited in extent by the bedrock slopes of Niles Canyon.

If groundwater occurs in bedrock, it is found in secondary fractures and cavities, and the porosity and transmissivity of this fracture flow is typically low. Thus, like Sunol Valley, the bedrock is not considered a significant aquifer host due to the expected low yields. Furthermore, groundwater in the bedrock would not be strongly influenced by changes and fluctuations in Alameda Creek hydrology, as the hydraulic connection between the two is likely limited. Resource development of the shallow aquifer is therefore unlikely, as long-term yields from the aquifer are limited by the extent of the aquifer.

Niles Dam serves to raise the water level in Alameda Creek by approximately 4.5 feet on the upstream side (113.5 feet compared to 109 feet) and causes backwater effects that extend between 500 and 600 feet upstream (Weiss Associates, 2004). Without groundwater monitoring data, it is difficult to accurately describe existing groundwater conditions within the shallow alluvial aquifer. It is possible, however, to make a reasonable interpretation based on technical data, site observation, and knowledge of aquifer behavior at Sunol Dam.

The shallow alluvial aquifer system is well connected to surface water in Alameda Creek. It is reasonable to assume that the amount of groundwater in the shallow aquifer is dependent on the water level in Alameda Creek, and that there is a shallow groundwater gradient directing flow toward Alameda Creek. The shallow groundwater gradient could change on a short-term basis as the limited aquifer responds to precipitation and recharge of shallow groundwater, and as the water level in Alameda Creek fluctuates. The range of seasonal groundwater fluctuation at Niles Dam is expected to be less than at Sunol Dam due to the limited extent of the shallow aquifer, probably about 1 to 3 feet. In the immediate vicinity of the dam abutment, groundwater would flow from the higher water levels behind the dam to the lower water levels downstream, resulting in a groundwater flow pattern similar to that at Sunol Dam (see Figures 18a and 18b). The floodplain at Niles Dam may be only slightly elevated from the water table year-round, producing a condition that may help support a riparian community. No groundwater was identified within the influence of Niles Dam.

Water Quality

Surface Water

Water quality in Alameda Creek was analyzed as part of the *Alameda Creek Water Resources Study* (Bookman-Edmonston, 1995). Water quality testing indicated that the quality of Alameda Creek water is acceptable for establishing a trout population. Water temperature, dissolved oxygen, pH, hydrogen sulfide, copper, iron, and manganese in Alameda Creek surface water are within water quality criteria established by the U.S. Environmental Protection Agency for the protection of aquatic life.

Groundwater Quality

Groundwater within the project area is calcium-magnesium bicarbonate water, with concentrations of individual constituents at generally low levels. Total dissolved solids (TDS) are low, ranging from about 350 to 500 milligrams per liter (mg/L), as are nitrate concentrations,

from 1 to 6 mg/L, with the exception of some localized and elevated nitrate and TDS concentrations in shallow groundwater due to historic agricultural practices (Bookman-Edmonston, 1995).

Regulatory Framework

Regulatory authorities on both the state and federal levels regulate water quality in California. The major federal legislation governing the water quality aspects of the project is the Clean Water Act, as amended by the Water Quality Act of 1987. The objective of the act is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides the basis for water quality regulation within California. The State Water Resources Control Board (SWRCB) administers water rights, water pollution control, and water quality functions throughout the state, while the Regional Water Quality Control Boards (RWQCBs) conduct planning, permitting, and enforcement activities.

State and Regional Water Quality Control Boards

The California legislature assigned the primary responsibility for the protection and enhancement of water quality in California to the SWRCB and the nine RWQCBs. The SWRCB coordinates California's water quality programs by establishing policies and plans for the implementation of state and federal laws and regulations. The RWQCBs adopt and implement water quality control plans (basin plans) that recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems.

The project area lies within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). The SFBRWQCB has set water quality objectives for all surface waters in the region with respect to bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, salinity, sediment, settleable material, suspended material, sulfide, taste and odor, temperature, toxicity, turbidity, and un-ionized ammonia. Chemical constituents are regulated depending upon the beneficial use of the water body. Water quality objectives are also set for groundwater with respect to bacteria, organic and inorganic chemical constituents, radioactivity, and taste and odor.

Beneficial uses of surface waters are described in *The San Francisco Bay Basin Plan* (SFBRWQCB, 1995) and are designated for major surface waters and their tributaries. Beneficial uses of the southern San Francisco Bay include estuarine habitat, industrial service supply, fish migration, navigation, preservation of rare and endangered species, recreation, shellfish harvesting, wildlife habitat, and ocean, commercial, and sport fishing.

Construction Activity Permitting

The SFBRWQCB monitors and enforces the National Pollutant Discharge Elimination System (NPDES) stormwater permitting for the region. The SWRCB administers the NPDES permit program through its General Permit (SWRCB, 2004). Construction activities involving one acre or more are subject to the permitting requirements of the NPDES General Permit for Discharges

of Storm Water Runoff Associated with Construction Activity (General Construction Permit). The project sponsor (in this case, the SFPUC) must submit a Notice of Intent to the SWRCB in order to be covered by the General Permit prior to the beginning of construction. The General Construction Permit requires the preparation and implementation of a stormwater pollution prevention plan (SWPPP), which must be prepared before construction begins. Components of SWPPPs typically include specifications for best management practices (BMPs) to be implemented during project construction for the purpose of minimizing the discharge of pollutants in stormwater from the construction area. In addition, a SWPPP includes measures to minimize the amount of pollutants in runoff after construction is completed and identifies a plan to inspect and maintain project BMPs and facilities.

Impacts

Significance Criteria

The City of San Francisco has not formally adopted significance standards for hydrology and water quality impacts, but generally considers that implementation of the proposed project would have a significant effect on hydrology and water quality if it were to:

- Substantially change absorption rates, drainage patterns, or the rate and amount of surface water runoff;
- Substantially degrade water quality;
- Contaminate a public water supply;
- Substantially degrade or deplete groundwater resources or interfere with groundwater recharge; or
- Cause substantial flooding.

Degradation of Water Quality During Dam Deconstruction

Dam removal at both sites would involve earthmoving and grading to provide access to the sites as well as to expose the dams for demolition. Temporary soil erosion during demolition and related activities could cause excess sediment loads to Alameda Creek from altered banks in the wet season(s) following construction. Project-induced, onsite erosion could introduce fine sediment from disturbed slopes adjacent to the creek, increasing turbidity and elevating suspended sediment loads during high flow events; however, project-related erosion is expected to be in line with normal erosion and sediment transport during such conditions. Additionally, eroded sediment could provide aquatic habitat downstream of the site. Finally, the high percentage of gravels in the impounded sediments indicates that turbidity would be less of a water quality issue than erosion of sediments with high volumes of silt.

Impounded sediments were sampled and analyzed for a suite of potential contaminants, with no contamination detected. Additionally, stakeholder agencies were contacted regarding their

sediment removal operations, and no history of contamination of dredged sediments was found (Geomatrix Consultants, 2004).

Dam removal would also involve installation of creek diversion structures and dewatering of the worksite. Dewatering would be necessary to remove the remaining surface water within the worksite (defined by the upstream and downstream cofferdams or dam partition cofferdams) as well as groundwater seeping into the site. This activity would likely generate sediment-laden water, which, if discharged unabated to Alameda Creek, could generate high sediment loads. Excess sediment could affect water quality immediately downstream of the site and elevate turbidity above background levels. Project-induced turbidity could affect downstream aquatic environments, both through suspended sediment and aggradation[13] during low-flow conditions.

Dam removal activities would be scheduled for the dry season, with in-creek activities limited to the period between June and October. Limiting demolition to periods of low creek flow, lowered groundwater, and minimal precipitation would reduce the amount of diversion and, more importantly, the volume of discharge from dewatering; it would also reduce potential ancillary sediment generation from construction traffic. Although proposed grading, dam removal work, temporary water diversion, and other activities could result in potentially significant impacts, the impacts would be mitigable. Implementation by the SFPUC of Mitigation Measures F-1a through F-1c would reduce these impacts to a less-than-significant level.

Water quality impacts are not expected with the use of soundless chemical demolition agents (SCDAs). SCDAs do not contain hazardous components, are stable, and will not result in hazardous polymerization[14] (SFPUC, 2005). No impact will result.

Hydrogeological Changes

Sunol Dam

The main hydrogeological change following removal of Sunol Dam would be an adjustment of groundwater levels to reflect new hydraulic conditions. Sunol Dam has artificially raised groundwater levels, and removal of the dam is expected to reduce groundwater levels by up to 10 feet in the immediate vicinity of the dam. Groundwater elevations farther back into the valley and laterally away from Alameda Creek would also experience a reduction in groundwater level, although to a lesser degree. Groundwater levels in response to dam removal could take decades to re-equilibrate.

The identified zones of riparian vegetation between Alameda Creek and the depressions and between Sunol Dam and the confluence of Alameda Creek with Arroyo de la Laguna could be indirectly affected by this change in groundwater conditions. Impacts associated with reduced groundwater could occur in the riparian habitat immediately adjacent to the current backwater of the dam. Riparian habitat is most pronounced upstream from Sunol Dam, along the bank between the dam and the depressions/access road, and extends beyond Forebay C and the confluence with

[13] Aggradation is the accumulation of sediment in a stream channel or floodplain.
[14] Polymerization is any process in which relatively small molecules combine chemically to produce a very large chainlike or network molecule, called a polymer.

Arroyo de la Laguna (see Figure 16). This tract corresponds with alluvial gravel and soil deposits. The opposite side of the creek is essentially bedrock, and the effects of dam removal and groundwater response would be less pronounced in this area. Impacts to riparian habitat due to reduced groundwater levels are not considered major beyond the creek's confluence with Arroyo de la Laguna. Removing Sunol Dam would lower groundwater levels adjacent to Alameda Creek between the dam and the confluence with Arroyo de la Laguna. The lowered seasonal groundwater levels could adversely affect the stands of riparian vegetation that have developed in this zone. The impact to riparian habitat is significant but mitigable and is addressed in Chapter V, Mitigation Measures, under Biological Resources, Mitigation Measure D-9.

Reduced groundwater levels could affect the long-term water cycles on which riparian vegetation depends. It is difficult to accurately estimate post-dam removal groundwater levels over the long term, given the lack of consistent and historical groundwater monitoring data. However, based on the available data it is possible to infer the following: First, groundwater levels in the valley and near the entrance to Niles Canyon would continue to fluctuate seasonally. Second, the new dam elevation would define groundwater at a fixed level, 10 feet lower than that currently observed. It is reasonable to assume that this elevation would be close to 196 feet msl. Third, the confluence between Alameda Creek and Arroyo de la Laguna would continue to maintain groundwater levels at about 217 feet msl, and Arroyo de la Laguna upstream from the confluence would continue to provide recharge to shallow groundwater and act as a sub-groundwater divide. Finally, if the infiltration galleries were at least partially submerged, they would still remove groundwater from the system, even though the current operational capacity of the galleries between Forebay C and Sunol Dam is uncertain, and evidence (Meier, 2005) suggests that the galleries are not infiltrating at full capacity.

As the riparian habitat is influenced by shallow groundwater, the depressions adjacent to Alameda Creek are also reliant on shallow groundwater to maintain habitat. It is likely that removing Sunol Dam would sufficiently lower groundwater levels that the degree of inundation experienced in the depressions (both in terms of depth and duration of inundation) would be significantly less than that currently observed. A reduced degree of inundation could adversely affect habitat that has developed in the depressions. The lowered hydraulic head due to dam removal would propagate outward, reducing groundwater levels adjacent to the creek.

In the vicinity of the depressions, it is reasonable to suggest that an average reduction in groundwater levels would be approximately 3 to 7 feet. In other words, after removal of Sunol Dam, groundwater elevations in the vicinity of the depressions could settle to the levels indicated below:

High Estimate: Dry Season (September) – 205 feet to Wet Season (April) – 213 feet
Low Estimate: Dry Season (September) – 201 feet to Wet Season (April) – 209 feet

Following dam removal, it can therefore be expected that shallow groundwater would have less influence on maintaining seasonal marsh conditions in these depressions. This interpretation is based on an assumption that the infiltration gallery along this reach is not operating at optimal capacity, and thus is not greatly influencing groundwater dynamics.

The depressions would still receive seasonal water from precipitation, in quantities that could be sufficient to maintain a wet area during the rainy season; however, reduced groundwater influence is expected to affect habitat in the base of the depressions. This impact could be more pronounced during dry or drought conditions, when the dry season groundwater levels in the vicinity of the depressions would be at the low range indicated above. The reduction of groundwater in the depressions is significant because of the presence of California red-legged frogs (CRLF) in one of the depressions. The impact to CRLF habitat is significant but mitigable and is addressed in Chapter V, Mitigation Measures, under Biological Resources, Mitigation Measures D-4a and D-4b.

The primary area of impact due to lowered groundwater levels would be observed downstream of the Water Temple; however, there could be a small reduction in the infiltration capacity of the galleries upstream of the Water Temple as a result of dam removal. This effect is expected to be minor, if at all noticeable, because of the distance between the Water Temple and the dam site. The potential impact of reduced flows through the Water Temple and the effects of this reduction on the temple's historical significance are discussed in Section IV.G, Historical Resources.

Niles Dam

Removal of Niles Dam would alter the groundwater in the shallow alluvial aquifer in the immediate vicinity of the dam. This impact would be most pronounced nearest the dam, where a drop in groundwater levels equivalent to that in the creek water level would occur. The lateral extent of influence would likely be bounded by the bedrock walls of the canyon; in other words, the shallow aquifer is not sufficiently extensive to absorb the water level drop. The result would be a general lowering of the water table upstream of the dam, approximate to and just beyond the current backwater effect (500 to 600 feet upstream). The maximum groundwater level reduction would be approximately 4.5 feet in the immediate vicinity of the existing dam wall abutments. This effect would propagate outwards, away from Alameda Creek, with diminishing influence upstream. Due to the limited lateral extent of the shallow aquifer, and the paucity of groundwater users and groundwater-dependent habitat, the effect of a localized reduced groundwater level is less than significant.

Reduced groundwater would indirectly affect the riparian habitat. This vegetative community is partially reliant on shallow groundwater. The greatest effect would be in the vicinity of the dam abutments and just upstream, where the expected drop in groundwater level would be most pronounced.[15] The impact to riparian habitat is significant but mitigable and is addressed in Chapter V, Mitigation Measures, under Biological Resources, Mitigation Measure D-9.

Hydrological Changes

Removal of Sunol and Niles Dams could result in downstream flooding impacts due to alterations in surface water hydrology. Flooding concerns related to the proposed project are primarily of two types: (1) once removed, the dam structures on the watercourse would no longer attenuate

[15] Heavy equipment work associated with the dam removal would likely affect this tract of riparian vegetation to a much greater degree than a gradual reduction in groundwater levels.

flood stages, and (2) sediments left to erode from the existing impoundments once the dams are removed could redeposit downstream of the dams, increasing downstream water elevations during storm events and resulting in subsequent flooding.

With respect to the first concern, the existing dams are flow-over structures, meaning that they are not operated as flood management structures; Alameda Creek simply flows over the structures during all flow conditions, without attenuating high flows. Therefore, dam removal, if completed as proposed during low-flow conditions with a gradual dewatering of the impoundment, would not increase the risk of immediate or future flooding in the vicinity or downstream of the dam, and no impact would result.

The second flooding concern, regarding mobilization and transport of the impounded sediments downstream, is best analyzed by comparing impounded sediment volume and annual sediment load in the watercourse. When the sediment volume behind a dam is small relative to the annual sediment transport capacity, the impact on the downstream channel when sediment is released from behind the dam would likely be insignificant (Randle, 2004).

Table 10 presents a comparison of these quantities. As shown in the table, the total estimated volume of impounded sediment (65,900 tons) is 25 percent of the estimated annual average sediment load (269,000 tons per year) in Alameda Creek. A sediment pulse equivalent in size to that stored behind the dams is likely to be within the normal range of variability of sediments supplied to the channel on an annual basis (e.g., a sediment pulse introduced by landslides) (Weiss Associates, 2004).

Two sediment transport studies (Trihey & Associates, 2000; Weiss Associates, 2004) assessed the fate of sediments stored at Sunol and Niles Dams after dam removal. Both studies involved the collection of field data and computer modeling using U.S. Army Corps of Engineers model HEC-RAS, a standard application used for hydraulic analysis of creeks and rivers. The primary conclusion of both studies was that in normal and above-normal water years, the sediment stored at both dams would be mobilized and transported downstream after dam removal.

Sediment modeling for the Trihey & Associates study concentrated on the magnitude and frequency of storms that would mobilize sediment; however, it only provided a general indication of the fate of sediments once mobilized. Results of the modeling indicated that the sediment currently impounded behind the two dams would mobilize during normal and above-normal flow conditions, and that the sediment would mobilize and flush from current impoundments in less than five years.

The Trihey & Associatesstudy concluded that the bed material would be conveyed downstream and deposited in low-velocity areas, such as behind vegetation, on the floodplain, or on point bars. Some of the material would eventually exit Niles Canyon and be deposited in the flood control channel. Deposition in the lower reach of Alameda Creek could increase the flood risk if enough of the material stored behind the dams were to deposit at once. However, this material

would most likely be deposited throughout Niles Canyon in a dispersional[16] fashion and would travel over a longer period than it would take to erode from behind the dams (one year or less for Niles Dam, five to seven years for Sunol Dam) (Trihey & Associates, 2000).

The study prepared by Weiss Associates (2004) produced similar conclusions regarding the fate of sediments behind each of the dams under natural flow conditions of the creek; the study concluded that the sediments would likely mobilize and be transported downstream. Weiss Associates calculated that a 3.5-year flow event (i.e., an event likely to happen every 3.5 years) would mobilize the estimated volume of stored sediment (65,900 tons) over the course of one day. Weiss Associates noted that the amount of sediment stored behind the dams is relatively small compared to the total sediment load transported by Alameda Creek, and that natural sediment storage features in Niles Canyon would moderate the impacts of mobilized sediment as the sediment travels downstream. The resulting sediment pulse would be dispersional rather than translational,[17] reducing the likelihood of significant aggradation in any one reach of the creek. In addition, the size of the sediment pulse is expected to be within the range of normal variability.

In other words, the erosion of the sediments stored behind the dams is expected to be similar to other naturally occurring events, such as sediment introduced into the creek by landslides. However, some aggradation could occur, mostly enlarging existing sediment storage features in Niles Canyon. Aggradation effects are not expected to be severe or to result in a permanent channel change, with sediment dispersion downstream occurring over a decade.

With regard to the flood control channel, the Weiss Associates study concluded that almost all sediment would eventually reach the flood control channel over a period of one to a few decades. Some sediment would deposit in the flood control channel and some would pass through to San Francisco Bay. Given the timeframe for transport and the relatively small volume of sediment stored behind the dams compared to the annual loads over the period of adjustment, the impact to the flood control channel is not expected to be significant.

To summarize, after removal of the dams, sediments are expected to be transported downstream gradually and be deposited and stored throughout Niles Canyon. Sediment would eventually be transported downstream to the flood control channel; some sediment would be deposited in the channel and would require subsequent removal. However, given the expected gradual nature of the sediment movement and the relatively small percentage of impounded sediment volume compared to annual sediment load in the river, the flood risk impacts are expected to be less than significant.

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[16] Dispersional indicates the scattering of the sediment over the length and width of the creek.
[17] Translational movement indicates plug or slug flow movement, such that all the sediment would move as one mass and relocate to another location in the creek (an unlikely scenario).

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G. Historical Resources

Introduction

This section provides a historical context and setting for Niles Canyon, including a description of the significant historical resources within the project area, as well as an evaluation of potential impacts to historical resources that could occur as a result of the project.

"Historical resources" includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript that is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California (CEQA Guidelines Section 15064.5).

Much of the information in this section was obtained from a historic resource assessment of the Spring Valley Water Company's (SVWC) Alameda Creek system completed for this DEIR (JRP, 2003).

Setting

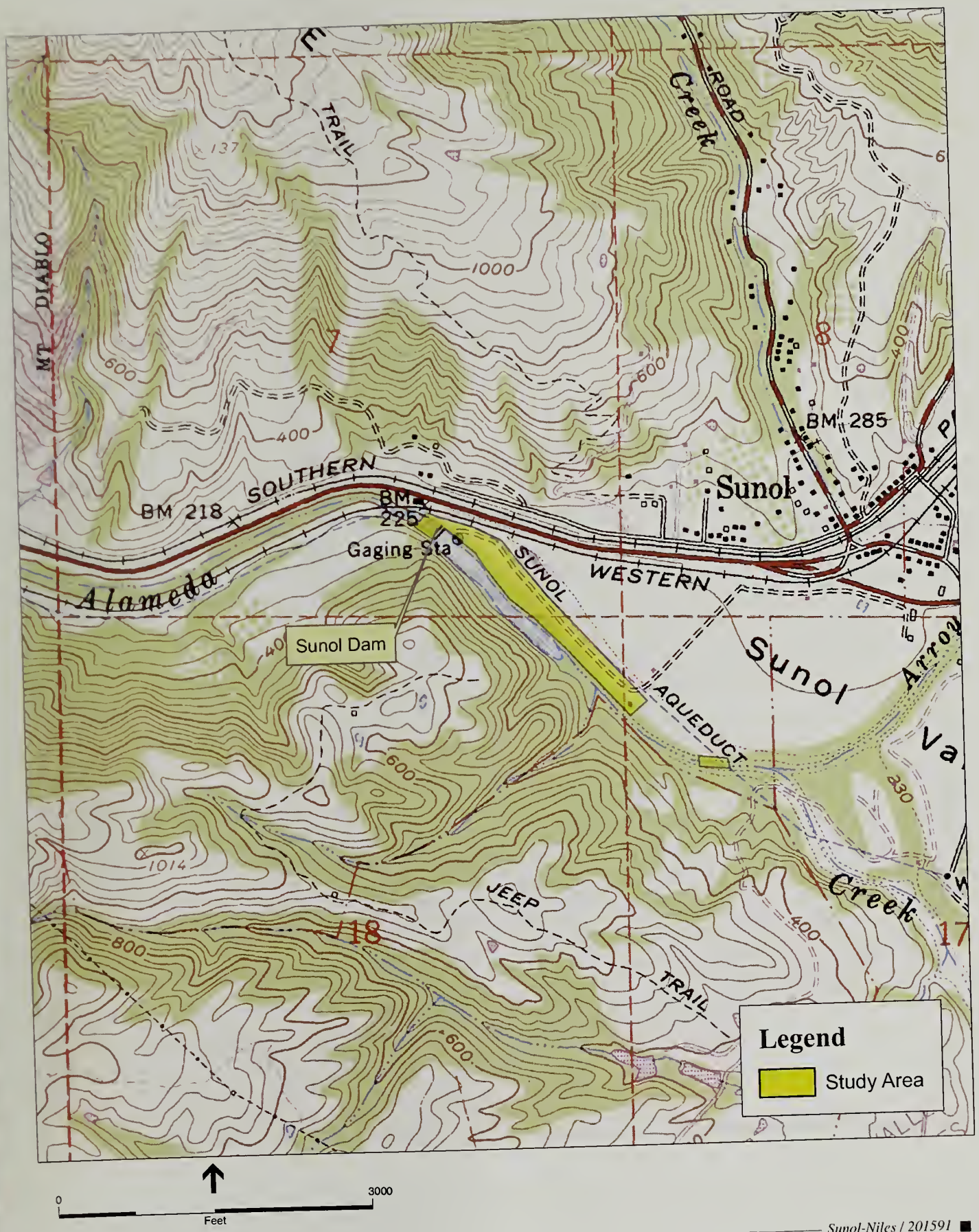
Archaeological Context

Research Methods

The efforts to identify archaeological resources in the project area consisted of archival research, contacts with Native Americans (for archaeological resources only), and field surveys. The project area was defined in consultation with the SFPUC and the San Francisco Planning Department, Major Environmental Analysis Section. Archaeological and historical resources within this area of proposed ground disturbance are the most likely to be affected by the proposed project (see Figures 21 and 22).

Archival Methods

A records search of all pertinent survey and site data was conducted at the Northwest Information Center at Sonoma State University on October 5, 2004 (File No. 04-298). The records were accessed by utilizing the Niles U.S. Geological Survey (USGS) 7.5-minute quadrangle map, Sections 7 and 10, Township 4S, Range 1W and 1E. The review included the project area and a ¼-mile buffer. Previous surveys and studies and archaeological site records were accessed as they pertained to the project area. Records were also reviewed in the Directory of Properties in the Historic Property Data File for Alameda County (2004) for information on sites of recognized historical significance. Properties within the project area listed in the National Register of Historic Places (NRHP, 2004), the California Register of Historical Resources (CRHR, 2004), the California Inventory of Historic Resources (1976), the California Historical Landmarks (1996), and the California Points of Historical Interest (1992) were also searched.



SOURCE: USGS 7.5' Niles, Calif., 1980

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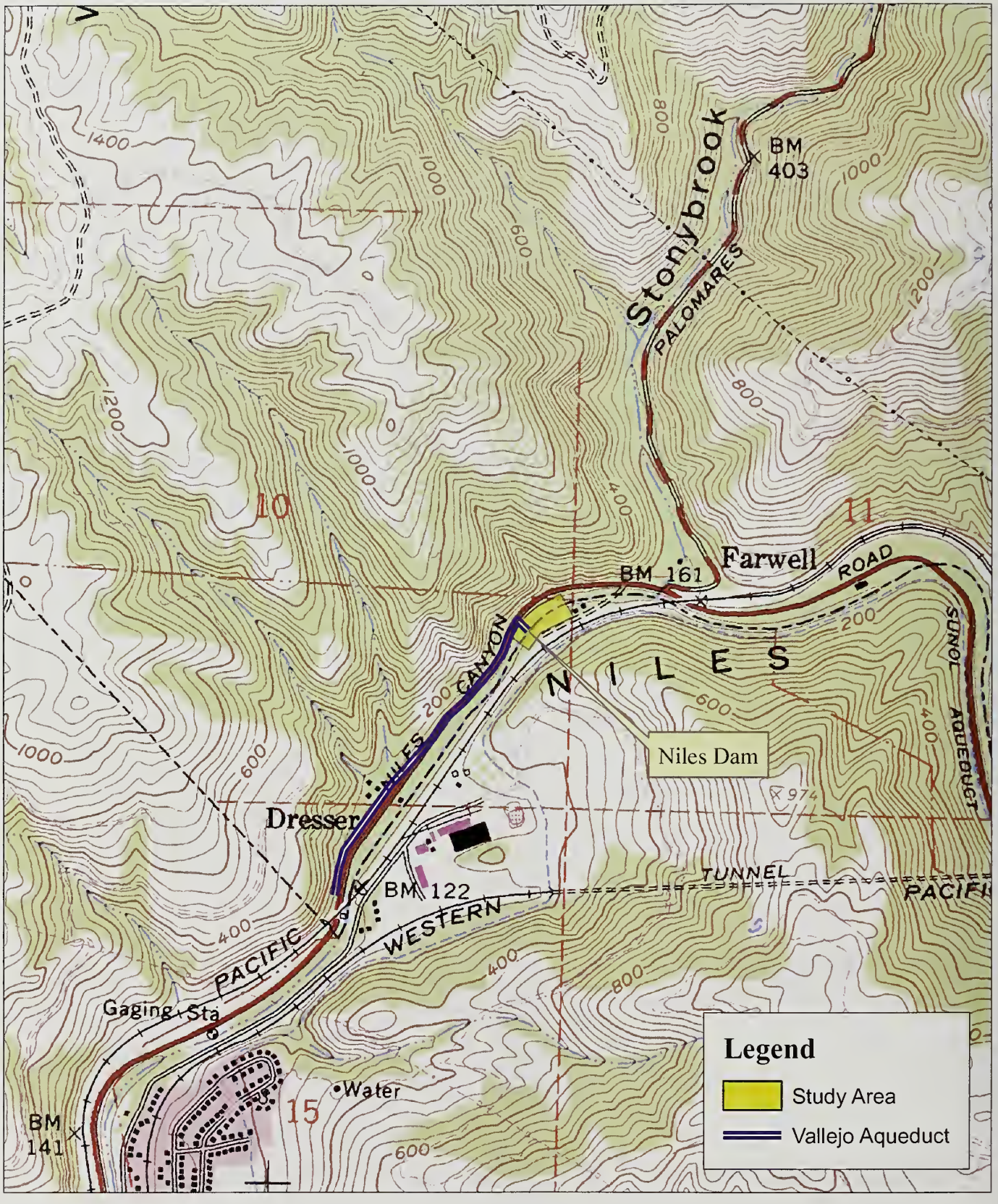
Figure 21
Sunol Dam Cultural Resource Survey Map



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SOURCE: USGS 7.5' Niles, Calif., 1980

Figure 22
Niles Dam Cultural Resource Survey Map

Archaeological Survey Methods

An archaeological field inspection of the project area was conducted on November 23, 2004 by Registered Professional Archaeologist, Dean Martorana, M.A., of ESA. The surface of the project area was inspected using solo survey transects in a zig-zag pattern.

Ground surface visibility varied in both the Sunol and Niles project areas. The Niles Dam project area consists of dense streambed vegetation and cobble, with the southern streambed portion, also known as the Joyland Park site, composed of mostly grassy ground cover; consequently, the overall visibility of the area was poor. In the Sunol Dam project area, the riparian corridor along the northern bank of Alameda Creek is relatively flat and allowed for adequate surface inspection. A portion of the Sunol Dam project area is paved for access to the dam. The southern bank, however, is inaccessible due to steep terrain.

Archival Results

No archaeological resources were previously identified in the Sunol and Niles project areas. A number of the properties within the SVWC's Alameda Creek system have been determined to be eligible for listing in the NRHP and CRHR, none have been officially nominated for listing (see Table 11). The records search revealed that a number of archaeological resource surveys have been conducted near the project area. Among the most relevant studies, a recent investigation conducted in the Joyland Park area, located just east of Niles Dam on the southern bank of Alameda Creek, did not identify any significant archaeological or historical resources (Pastron and Engberg, 2004). Among other studies conducted in the Alameda Creek Canyon, Ananian (1993) identified six historical resources during the course of study for a proposed hiking trail along the Southern Pacific Railroad right-of-way. None of the sites identified were affected by the hiking trail project, nor were they formally evaluated for eligibility to the NRHP or CRHR. Chavez (1994) conducted a cursory survey for the *Alameda Watershed Management Plan*, during which no previously unrecorded sites were identified. California Department of Transportation (Caltrans) archaeologists also conducted archival and field studies for the Rosewarnes Underpass to Farwell Underpass safety improvements, which included the Niles Dam project area (Reynolds, 2004). No prehistoric resources were identified during the field survey. However, a prehistoric midden site, CA-Ala-4, is located on the Dresser Plateau, approximately ¼ mile southwest of Niles Dam.

Archaeological Survey Findings

No archaeological or historical structures were identified during the pedestrian survey conducted in November 2004. Bedrock outcrops were inspected closely for milling stations, and none were identified. Areas along the creekbed were subject to high water flows, and evidence of wood debris and fallen reeds was visible. Given the fluctuating water mark, especially during the winter months, the creekbed area that constitutes the project areas would not likely have served as a permanent or temporary prehistoric camp; consequently, surface scatters of lithics or other artifacts would not likely remain. The higher areas along the creek corridor, however, may be more probable sites for food processing and storage, as indicated by the presence of CA-Ala-4, a midden deposit, on the Dresser Plateau.

TABLE 11
PREVIOUSLY IDENTIFIED HISTORICAL RESOURCES IN PROJECT VICINITY

Site/Survey Designation	Location	Age/ Built Date	Description	Comments	Reference
CA-Ala-4	Dresser Plateau	Prehistoric	Shellmound	Last survey found site destroyed	Nelson, 1907; Ananian, 1993
CA-Ala-548H	Lower Niles Canyon	1841–1856	Vallejo's (Niles) dam, aqueduct, and mills	Eligible for NRHP[a] and CRHR[b]	Herbert & Ferrell, 2000; Scantlebury, 2004
Sunol Aqueduct	Niles Canyon	1900, 1921	4.9-mile water conveyance	Eligible for NRHP and CRHR	Krase, 1998
Sunol Dam	Upper Niles Canyon	1900	Concrete arch dam	Eligible for NRHP and CRHR	Herbert & Ferrell, 2000
Sunol Water Temple	Sunol Valley	1910	Fountain, carrefour, and pumphouse	Eligible for NRHP and CRHR	JRP, 2003
Union Pacific Railroad (CA-Ala-582)	Niles Canyon	1909–1910	Railroad	Eligible for NRHP and CRHR	McKee, 1998
Sunol Infiltration Galleries	Upper Niles Canyon	1920	Sunol Dam infiltration system	Eligible for NRHP and CRHR as a contributor	JRP, 2003
Niles Regulating Reservoir	North of Niles Canyon	1923	Earthen reservoir	Eligible for NRHP and CRHR as a contributor	JRP, 2003
Sunol Headquarters Complex		1875	Once served as SVWC's headquarters	Eligible for NRHP and CRHR as a contributor	JRP, 2003

[a] National Register of Historic Places
[b] California Register of Historic Resources

SOURCE: On file at the Northwest Information Center, Sonoma State University.

Prehistoric Setting

Toward the end of the Pleistocene (2 million years ago to 10,000 years before present), the San Francisco Bay region and central California coast experienced gradual shifts in coastal environmental conditions as sea levels rose in response to a general warming trend in climate (Fagan, 2003). Slowly, as human settlements began coping with the changing climate and landscape, the natural marshland biotic communities along the edges of bays and channels, in contrast to earlier vegetal food sources, became the principal source for subsistence and other activities in the San Francisco Bay region.

Many of the original surveys of archaeological sites in the Bay region, including the East Bay, were conducted between 1906 and 1908 by N.C. Nelson; these surveys yielded the initial documentation of nearly 425 "earth mounds and shell heaps" along the littoral zone of the Bay (Nelson, 1907). The most notable of these sites were excavated, such as the Emeryville shellmound (Ala-309), the Ellis Landing site (CCo-295) in Richmond, the Fernandez site (CCo-259) in Rodeo Valley, and the West Berkeley site (Ala-307) (Morrato, 1984). These dense midden (i.e., refuse) sites, such as Ala-309, have been carbon 14 dated to be 2,310 ± 220 years

old, but other evidence from around the Bay suggests that human occupation in the region is of greater antiquity, or ±7,000 years before present (Davis and Treganza, 1959). As mentioned, many of the earliest sites suggested less emphasis on shellfish than on hunting and vegetal food processing. These sites provided the basis for understanding cultural chronologies and evolution in the Bay Area.

Another site of equal importance, the West Berkeley site (Ala-307) (2000 BC to AD 300), reflected a change in socioeconomic and technological complexity and settlement patterns from the "Early Horizon" or Windmiller Central Valley influence to the more uniquely local Berkeley Pattern (Wallace and Lathrap, 1975; Fredrickson, 1973). This artifact pattern was represented by minimally shaped cobble mortar and pestle, dart and atlatl,[1] and bone industry. Given the size of these settlements, it is probable that the populations were more dense and sedentary yet continued to exploit a diverse resource base—from woodland, grassland, and marshland to bayshore resources throughout the San Francisco Bay Area (Bickel, 1978; King, 1974).

While the Bay shellmounds tended to predominate East Bay archaeology, a number of important sites have been investigated in the interior valleys of Alameda County. For example, the Santa Rita Village site (CA-Ala-413) in Pleasanton yielded numerous artifacts, burials, and ecofactual (plant and animal remains) data. The site also represented two stratagraphic components, indicating occupation from 400 BC to AD 100 (Chavez, 1994). Moreover, the later component revealed evidence of technological influence diffused from the Delta region.

Within the Alameda Creek riparian corridor is the Sunol Regional Wilderness Area Site, CA-Ala-428H. The site consists of a midden deposit and associated bedrock mortars. Obsidian hydration dates the site occupation from 343 BC to AD 1730 (Leventhal et al., 1989, as cited in Chavez, 1994).

Ethnographic Setting

At the time of initial European contact in 1772 by the Pedro Fages expedition, the Alameda Creek watershed region was inhabited by the Costanoan or Ohlone populations, known to the Spanish as "Costeños" (meaning "coast people"). Ethnographic accounts defined the Ohlone territory from the southern coastal region of the San Francisco Bay to Monterey (Levy, 1978; Margolin, 1978). The Ohlone of the San Francisco Bay Area were not a homogenous tribe or a single nation; rather, independent tribelets lived in a circumscribed, contiguous area. Slight variations in dialect exhibited by each village further distinguished tribelet membership. The tribelet served as the basis of sociopolitical organization and kinship reckoning. Despite having a common language base, the various tribelets were not bound together in any political sense.

Recent research indicates that the Sunol area was within the territory of the Causens/Patlan and Taunan triblets (Fredrickson et al., 1997; Leventhal et al., 1989). In general, triblet territories were defined by geographic features and likely had several permanent villages and numerous ephemeral, short-term camps, typically used for resource gathering or hunting.

[1] An Aztec term for spear thrower; a wooden device with a handle at one end and a hook or spur at the other that fits to the proximal end of a dart or projectile.

In addition to maintaining a diverse spectrum of dietary staples through hunting and gathering, the Ohlone engaged in other land management techniques. For instance, controlled burning of extensive areas was conducted each fall to promote the growth of seed-bearing annuals (Margolin, 1978). The frequent use of fire selects for certain types of grasses that are quick to grow back and for fire-retardant bushes and shrubs. As the frequency of fires increases, the overall composition of plant and animal communities changes. The amount of land available for grazing animals, such as deer, elk, and antelope, therefore increases, as do species populations.

The acorn was the most important dietary staple of the Ohlone. The coast live oak (*Quercus agrifolia*) and valley oak (*Quercus lobata*) were especially prized for their prolific acorn production. The acorns were ground to produce a meal that was leached to remove the bitter tannin. The Ohlone crafted tule balsa, basketry, lithics[2] such as mortars and pestles, and household utensils. Riverine and littoral resources were also exploited when available or economically suitable.

Historical Context

Although European contact with central California native peoples can be dated to as early as 1579 and contact with East Bay populations to 1772, no permanent and consequential influence by Europeans on the project area existed until the establishment of Mission Santa Clara in 1777 and Mission San Jose in 1797 by Spanish Franciscan missionary religious orders. The indigenous inhabitants were missionized sometime after the San Jose Mission was founded, meaning that the project area was probably depopulated by 1800 or sometime thereafter (Fredrickson et al., 1997). By 1822, however, the Mexican government gained control of California and, with the secularization of the mission and the division of land holdings into ranchos, the socioeconomic landscape of the Bay Area changed significantly. After the secularization of Bay Area missions in the 1830s, a number of Native American settlements (i.e., rancherias) were established by former neophytes (or a newly baptized mission Indian). Some of these rancherias ultimately became legally recognized communities. Some of these communities were important for revitalization movements that spread to other Native American communities in central California.

Jose de Jesus Vallejo's Rancho and Grist Mill

Niles Canyon was sparsely settled prior to the SVWC's development of Alameda Creek in the late 19th century. The lands that make up the project area were originally part of two ranchos, Rancho Arroyo de la Alameda and El Valle de San Jose. The ranchos in the region predominantly engaged in cattle ranching and subsistence farming. Most notably, the Rancho Arroyo de la Alameda encompassed 17,705.38 acres and was granted to Don Jose Vallejo in 1842, one year after he established a flourmill on Alameda Creek (JRP, 2003). Jose Vallejo constructed a dam, aqueduct, and his first mill (made of adobe) in 1841 at the base of Niles Canyon. Subsequently, "Vallejo constructed a second larger mill of redwood and stone in 1856 and then used the adobe as a storage shed. After the construction of the second mill, a settlement known as Vallejo Mills grew up around the mill in Niles Canyon. The ruins of Vallejo's Mill, dating from 1841 to 1856,

[2] Stone-based toolkits.

represent a portion of one of the earliest water conveyance devices in California (Archaeological Site No. CA-Ala-528/H), one of the earliest appropriative water rights in the state, and one of the earliest industries in Alameda County" (JRP, 2003).

After California became part of the United States in 1848, there were numerous disputes over the validity of Mexican land grants, and by 1860 most of the former rancho properties within the Alameda Creek lands were sold and redistributed to newcomers. This, in turn, led the SVWC to begin purchasing property along Alameda Creek, as well as other areas around San Francisco, in order to provide more water for San Francisco. "Despite the local protest, the Alameda County Board of Supervisors granted SVWC the right-of-way for its pipes, allowing the SVWC project to begin. The company had already built a small cottage at the Sunol site, circa 1875, that served as the foreman's cottage for the Alameda Creek system construction (Metcalf, 1973). The earliest work on the water conveyance system mainly included rebuilding the earlier system built by Don Jose Vallejo at Vallejo Mills. The SVWC first rebuilt and raised Niles Dam by capping Vallejo's original stone dam with concrete and replacing the wooden fish ladder with a concrete ladder. The stone-lined aqueduct constructed by Vallejo was found to be in good condition, and the SVWC covered it with a brick and mortar arched roof complete with manholes[3]" (JRP, 2003). The Vallejo Aqueduct was then used as part of the system to convey water to San Francisco through a 36-inch pipeline beginning one and three-quarter miles above Vallejo's Mill and running through Centerville and Newark to Dumbarton Point. Niles Dam and the Vallejo Aqueduct remained in operation only until 1900, when the Sunol Dam and aqueduct were constructed.

The SVWC built the Sunol Aqueduct at the same time as the Sunol Dam. According to the January 1924 issue of *San Francisco Water*:

> ...in 1900 the Sunol Aqueduct was built between Sunol and Niles on the southerly side of Alameda Creek Canyon to carry water from the Alameda Creek system. This aqueduct was composed of 14,600 feet of concrete-lined tunnel, having a carrying capacity of seventy million gallons daily, and 11,300 feet of redwood flume with a capacity of twenty-one million gallons daily, making a total length of 25,900 feet. To provide for carrying an additional supply of twenty-four million gallons daily, now being developed [at Calaveras], and for probable future development, the wooden-flume section was replaced by a six-by-six foot reinforced concrete flume having a bottom and side thickness of six inches and a top of four inches and a carrying capacity of seventy million gallons daily. The plans and estimates were prepared in the latter part of 1922; construction commenced April 1, 1923, and was completed September 15, 1923.

Ultimately, water from Calaveras Reservoir joined water from the Pleasanton pipeline in the Sunol Valley at the Sunol Water Temple. From the Water Temple an underground concrete conduit ran to the north side of Sunol Dam. It then passed through the dam to the south side

[3] The May 16, 1891 issue of the *Oakland Examiner* noted the condition of the old aqueduct: "So good was the workmanship of the stone aqueduct, that the company merely roofed it over with brick and used it as a portion of their underground waterway to the city."

where it entered the first of five tunnels that, together with aboveground sections of concrete conduit, formed the 4.9-mile-long Sunol Aqueduct.[4] The aqueduct conveyed the water down the south side of the canyon to Niles Regulating Reservoir (JRP, 2003).

Soon after the completion of the Hetch Hetchy Dam and pipeline, the City of San Francisco purchased the SVWC, in 1930. "Since the purchase of the Alameda Creek System, the City of San Francisco has used the SVWC's Alameda Creek system and the administrative complex has served as its Sunol Headquarters. The City has added several buildings to the site. The water delivery system has mainly been used to supply the local residents with water since the completion of the Hetch Hetchy system, and the Sunol Water Temple has been opened to the public" by the SFPUC (JRP, 2003).

Joyland Park

Joyland Park is located adjacent to Niles Dam. The history of Joyland Park is inherently linked to the development of the railroad system in Niles Canyon. The Central Pacific Railroad constructed a rail line through the Sunol Valley in 1869, after which the town of Vallejo Mills was renamed Niles, for a railroad official (McCann and Hinkel, 1937). The creation of the railroad allowed easy access into the canyon. Picnicking was a popular Victorian pastime throughout California and Niles Canyon, particularly its western aspect, which was a popular recreational destination due to easy access by rail from Oakland, San Jose, and San Francisco.

The Niles Canyon Railroad (NCRR) ran "picnic trains" into the canyon specifically for recreation, and there were up to ten picnicking sites, including the site known as Joyland Park. Up to 6,000 picnickers could use Niles Canyon per weekend (California Department of Transportation, 1998). The largest and most popular picnic ground was near the intersection of Palomares Road and State Route (SR) 84, near the Farwell station (County of Alameda et al., 2003). The Joyland Park site was a stop on the NCRR line for picnicking/refreshment. In the late 1800s, a station was located on the east side of the Farwell Bridge, which presumably allowed access to both the picnic ground near Palomares Road (Farwell) as well as Joyland Park.

Native American Consultation

The Native American Heritage Commission (NAHC) was contacted on March 15, 2004 to request a database search for sacred lands or other cultural properties of significance to local Native Americans. The sacred lands survey failed to indicate the presence of cultural resources in the project area. The NAHC provided a list of Native American contacts that might have further knowledge of the project area with respect to cultural resources and potential impacts to those resources due to the proposed project. Each person or organization on the NAHC list was contacted by letter requesting information about locations of importance to Native Americans. One response has been received as of the writing of this document (Garibay, 2004). She expressed no immediate concerns regarding the project, although she suggested that results of the field survey be distributed to her.

[4] In 1998, the California State Office of Historic Preservation concurred that the Sunol Aqueduct is eligible for listing in the National Register of Historic Places.

Anecdotal evidence has indicated that a gathering place for *Juncus* spp. (sedge grass) may exist near Sunol Dam. *Juncus* is documented as an ethnobotanical of Costanoans (Ohlone) for use as textile raw materials, stuffing and cordage, and basketry (Bocek, 1984). Ms. Garibay was contacted on April 14, 2005, but she did not know of such a gathering place. However, she did suggest contacting Bev Ortiz with the East Bay Regional Park District. The California Indian Basket Weavers Association (CIBA) was also contacted on March 8, 2005, but no response was received. Ms. Ortiz was contacted on April 20, 2005; Ms. Ortiz confirmed that a sedge grass gathering area is currently being used by Ohlone descendants for basketry. She organizes a group outing to gather sedge from a location east of Sunol Dam on the north bank of the Alameda Creek. The ACWD has permitted her and the group to use the site for these purposes for three years. The site is, according to Ms. Ortiz, a very rare and high-quality location for gathering sedge grass, given the floodplain character of the site and the general lack of pristine riverbanks in Alameda County (Ortiz, 2005).

In order to mitigate potential impacts due to the Sunol Dam removal on the sedge grass gathering place, all wetland species—including *Juncus* spp.—will be replaced as needed (see Biological Resources Mitigation Measures D-2d and D2e); therefore, any impacts to this site would be mitigated to a less-than-significant level.

Paleontologic Resources

Paleontologic resources are the fossilized evidence of past life found in the geologic record. Despite the tremendous volume of sedimentary rock deposits preserved worldwide, and the enormous number of organisms that have lived through time, preservation of plant or animal remains as fossils is an extremely rare occurrence. Because of the infrequency of fossil preservation, fossils—particularly vertebrate fossils—are considered to be nonrenewable resources. The rarity of fossils, and the scientific information they can provide, are highly significant records of ancient life. Paleontologic resource localities are those sites where the fossilized remains of extinct animals and/or plants have been preserved. Two localities have been identified at either end of Niles Canyon (University of California Museum of Paleontology, 2004):

- Niles Community (V5933) is a vertebrate locality identified near the town of Niles consisting of two Pleistocene mammalian specimens.
- Sunol (V6535) is also a vertebrate locality identified southwest of the town of Sunol consisting of a single Pleistocene mammalian specimen.

Rock formations that are considered of paleontologic sensitivity are those rock units that have yielded significant vertebrate or invertebrate fossil remains. This includes, but is not limited to, sedimentary rock units that contain significant paleontologic resources anywhere within its geographic extent. In the case of the above localities, no rock unit formation was identified. However, bedrock data for each locality indicate that neither locality share the formation(s) that underlies the project area (Graymer et al., 1996).

The Sunol and Niles Dam areas are both underlain by stream channel deposits and alluvial fan and fluvial deposits of gravely sand or sandy gravel of Holocene age (Helley and Graymer, 1997). These types of sediments would not likely yield significant paleontologic remains because they are surface deposits that are not considered fossil-bearing rock units. On the other hand, the bedrock outcrops exposed above the streambed—especially along the road grade—consist of sandstone and shale, which would possess a higher paleontologic sensitivity because these formations have previously yielded significant paleontologic resources.

Architectural/Structural Context

Historical Archival Research

JRP Historical Consulting Services was contracted to perform the identification and evaluation of the properties associated with the SVWC's Alameda Creek system, which include Sunol and Niles Dams (JRP, 2003). JRP also conducted an archival review of existing documentation for the project area. This research included consulting state and federal lists to assess the location of known historic properties within this system as well as reviewing previous historical resource inventory and evaluation reports. JRP also reviewed area maps and historic aerial photographs, and conducted additional background research at the California State Library, Sacramento, the Bancroft Library, and the SFPUC.

Historical Architecture Survey Methods

On the basis of archival research, previously unrecorded or unevaluated properties that pertained to the system were inspected in the field and recorded and photographed per the standards of the California Department of Parks and Recreation, Office of Historic Preservation (JRP, 2003).

Historical Architectural and Structural Resource Survey Findings

The results of the historic inventory and evaluation determined that several properties are eligible for inclusion as historical resources in the CRHP (Public Resources Code Section SS5024.1, California Code of Regulations [CCR], Title 14, Section 4852). The components of the SVWC's Alameda Creek system (excluding the Vallejo Mills site and aqueduct) were found by JRP to meet the criteria for listing in the NRHP as a historic district (36 Code of Federal Regulations [CFR] 800). This system consists of Sunol Dam, Sunol Valley Filter Beds, Sunol Water Temple, Sunol Aqueduct, Niles Dam, Niles Regulating Reservoir, and the former SVWC's Alameda Headquarters (JRP, 2003). All of these properties, save the headquarters complex, are contributors to the district. All of the properties, with the exception of the Niles Regulating Reservoir and the headquarters complex, were also found to be individually eligible for the NRHP and CRHR (JRP, 2003).

In a separate study conducted by Caltrans, the Vallejo Mills/SVWC system, which includes a diversion structure (Niles Dam), turnout, gatehouse, and the Vallejo Aqueduct, was found to be a historic resource and eligible for listing in the NRHP and CRHR under Criteria A and D (Scantlebury, 2004). The applicability of Criterion D (or the property's potential to yield data that addresses specific research questions) is chiefly related to the original 1841 water conveyance

system. The majority of the presently visible portions of the Vallejo Mills/SVWC system are associated with later reconstruction that adapted the older system to domestic water supply needs (Scantlebury, 2004). In addition, intact portions of the Vallejo Aqueduct were identified below the roadway (see Figure 21). The State Historic Preservation Officer (SHPO) has concurred with the eligibility of the Vallejo Mills/SVWC system for the NRHP (Scantlebury, 2004).

Impacts

Significance Criteria

According to the CEQA Guidelines (Section 15064.5[a][3]), a resource is generally considered "historically significant" if the resource meets the criteria for listing in the CRHR (Public Resources Code Section SS5024.1, CCR, Title 14, Section 4852). A "historical resource" is defined as any site that:

1) Is listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR, or is determined to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California; and

2) Meets any of the following criteria:

   a) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

   b) Is associated with the lives of persons important in our past;

   c) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

   d) Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, a resource included in a local register of historical resources, as defined by Section 5020.1(k) of the Public Resources Code or identified as significant in a historical resource survey meeting the requirements of Section 5024.l(g) of the Public Resources Code, is presumed to be historically or culturally significant.

CEQA requires that the effects of a project on an archaeological resource be taken into consideration, and that if a project may affect an archaeological resource that it first be determined if the archaeological resource is a "historical resource"; that is, if the archaeological resource meets the criteria for listing in the CRHR (CEQA Guidelines Sections 15064.5[a][1] and [3] and [c][1] and [2]). An archaeological resource that qualifies as a "historical resource" under CEQA, generally, qualifies for listing under Criterion "D" of the CRHR (CEQA Guidelines Section 15064.5[a][3][D]). An archaeological resource may qualify for listing under Criterion D when it can be demonstrated that the resource has the potential to significantly contribute to questions of scientific or historical importance.

Archaeological resources that are not historical resources according to the above definitions may be "unique archaeological resources," as defined in Public Resources Code Section 21083.2, which generally provides that "non-unique archaeological resources" do not receive any protection under CEQA. If an archaeological resource is neither a unique archaeological resource nor a historical resource, the effects of a project on those resources are not considered significant. It is sufficient that both the resource and the effect on it be noted in the EIR, but such resources need not be considered further in the CEQA process.

CEQA Guidelines Section 15064.5 provides that, in general, a resource not listed on state or local registers of historical resources be considered by the lead agency to be historically significant if the resource meets the criteria for listing in the CRHR. This section also provides standards for determining what constitutes a "substantial adverse change" to archaeological or historical resources, including physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired (CEQA Guidelines Section 15064.5[b][1]).

Impact Analysis

Historical Resources

Architectural Resources

Demolition of Sunol and Niles Dams would cause a substantial adverse change in the significance of a historical resource, which is considered a significant impact. CEQA requires that all feasible mitigation be undertaken, even if it does not mitigate the impact to a less-than-significant level. Implementation of mitigation measures (see Chapter V, Mitigation Measures G-1a and G-1b) would not reduce the impact to these two historical resources to a less-than-significant level. As such, the proposed project would result in significant unavoidable impacts to Sunol and Niles Dams.

The evaluation conducted by JRP (2000, 2003) concluded that Sunol and Niles Dams are individually eligible for the NRHP and, thus, the CRHR. Additional resources also evaluated and found to be eligible properties were the Sunol Valley Filter Beds, the Sunol Water Temple, the Sunol Aqueduct, the Niles Regulating Reservoir, and SVWC's Alameda Headquarters. With the exception of the headquarters, the above resources were determined to qualify as a historic district. As discussed above, research conducted by Caltrans (Scantlebury, 2004) concluded that the Vallejo Aqueduct also qualifies for the NRHP and CRHR (Criteria A and D). Among these resources, only Sunol and Niles Dams and the Vallejo Aqueduct would be adversely affected by the proposed project.

JRP (2000, 2003) determined Sunol Dam to be eligible under Criterion A for its association with urban water supply history, and under Criterion C because the dam is a significant example of engineering design by master engineer Herman Schussler. Niles Dam is also eligible under Criterion A for its association with urban water supply history, under Criterion B for its association with Don Jose de Jesus Vallejo, and under Criterion D for its potential to yield information regarding Mexican-era dam construction. Therefore, the proposed demolition of

these dams would materially alter the physical characteristics that convey the significance of the historical resources and is therefore considered a significant impact. Implementation of Mitigation Measure G-1a would document the significance of the historical resources, but would not reduce the impacts to a less-than-significant level.

The removal of Sunol Dam would result in reduced groundwater levels that could extend upstream from the dam, which could decrease the average yield from the infiltration galleries and in turn reduce the quantity of water flowing through the Sunol Water Temple. The water flows are a character-defining feature of the Temple; inflows are the temple's reason for being, and complete dewatering could be viewed as a loss of resource integrity. However, it does not appear that the Water Temple would be completely dewatered as a result of the dam removal (see Section IV.F, Hydrology, Groundwater, and Water Quality, for a discussion of groundwater and the Sunol Water Temple); the expected reduction of inflows would not significantly affect those features of the Water Temple that convey its significance.

Archaeological Resources

Archaeological sites may consist of both surface and subsurface components, with evidence beneath the surface often much more extensive than that visible above. Much of the project area is within the high water mark of Alameda Creek; therefore, the possibility of finding surface indicators of prehistoric sites is low. However, evidence of prehistoric use in the area, specifically with the presence of CA-Ala-4 and in areas above the high water mark, indicates that the area could contain prehistoric resources.

The original rock dam constructed by Jose de Jesus Vallejo in 1841 over which the existing Niles Dam was built has been determined to be eligible for listing in the NRHP/CRHR under Criterion A for its association with early agricultural/industrial development and the evolution of urban water supply in the region, and under Criterion C as a contributor to the potential SVWC Alameda Creek system historic district (Scantlebury, 2004). The original stone aqueduct constructed by Vallejo in 1841 and possibly modified in 1856 has been determined to be eligible for listing in the NRHP under Criterion A for its early construction and its association with agricultural/industrial development and the evolution of urban water supply in the region, and possibly as the first such water conveyance system in Northern California. Both the Vallejo Dam and Aqueduct have been determined to be eligible for listing in the NRHP under Criterion D for the potential to yield information on the early problem-solving construction techniques for water conveyance systems that addressed the difficult terrain of narrow Niles Canyon and the seasonal changes to the creek flow (Scantlebury, 2004). The proposed project has the potential to adversely affect the remains of the original Vallejo Dam and/or Aqueduct, which are historical resources under CEQA. Implementation of Mitigation Measure G-1b would result in the preservation of all scientific/historical information or of representative remains of the Vallejo Dam and Aqueduct and would thus reduce project effects to these historical resources to a less-than-significant level.

Ground-disturbing activities in the areas surrounding Sunol and Niles Dams could cause substantial adverse changes to the significance of currently unknown, or poorly recorded,

archaeological resources. This would be a less-than-significant impact with implementation of Mitigation Measures G-2a and G-2b.

Section 106 of the National Historic Preservation Act (36 CFR 800) require preparation of a memorandum of agreement (MOA) for the proposed action; therefore, mitigation measures will be implemented in concert with stipulations outlined in the MOA.

Paleontologic Resources

The proposed project could adversely affect unidentified paleontologic resources at the site. This impact is a potentially significant but mitigable. The sediments encountered at the Sunol and Niles Dam sites would not likely yield significant paleontologic remains because these sediments are surface deposits; however, the surrounding sandstone and shale formations possess higher paleontologic sensitivity, as these formations have previously yielded significant paleontologic resources. Nevertheless, due to the limited exposure required for the dam removals, the possibility of encountering fossil-bearing deposits is minimal. However, significant fossil discoveries can be made even in areas designated as having low potential and could result from excavation for the proposed project. Excavation activities can have a deleterious effect on such resources. This impact would be reduced to a less-than-significant level with the incorporation of Mitigation Measure G-3.

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H. Noise and Vibration

Setting

Noise Principles and Descriptors

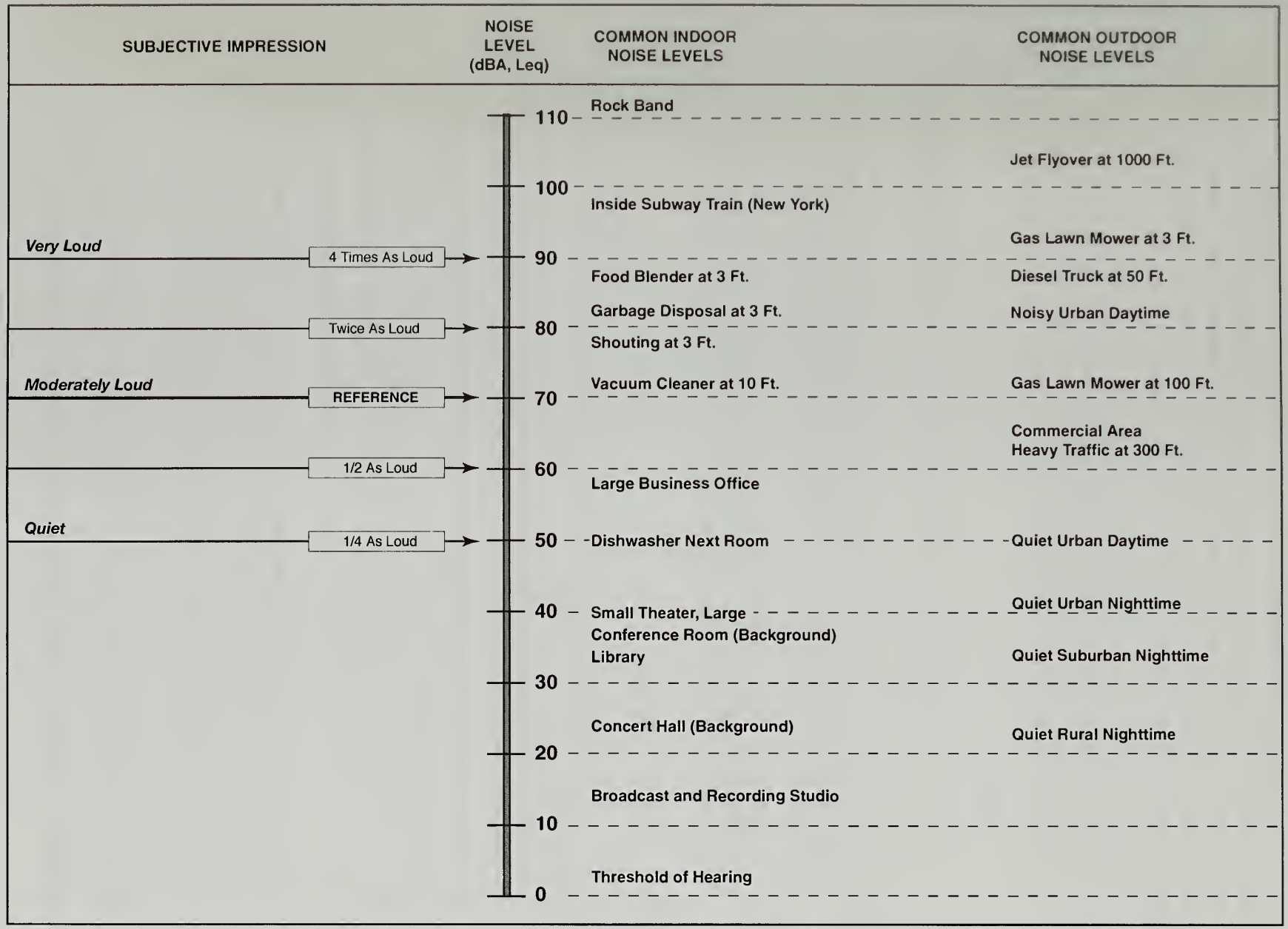
Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level). Sound levels are measured in decibels (dB), with 0 dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound. Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted that consists of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).[1] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in Figure 23.

Noise Exposure and Community Noise

The noise levels presented in Figure 23 are representative of measured noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. Rather, noise levels and thus the community noise environment vary continuously over time. Community noise is primarily the product of many distant noise sources that merge together to form a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens) that are readily identifiable to the individual.

[1] All noise levels reported herein reflect A-weighted decibels unless otherwise stated.



SOURCE: Caltrans Transportation Laboratory Noise Manual, 1982; Environmental Science Associates, 2005

Sunol-Niles / 201591 ■

Figure 23
Typical Sound Levels
Measured in the Environment

Because of these successive additions of sound to the community noise environment, the community noise level varies from instant to instant. To legitimately characterize the community noise environment and evaluate cumulative noise impacts, noise exposure must be measured over a period of time. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: The instantaneous maximum noise level for a specified period of time.

L_{50}: The noise level that is equaled or exceeded 50 percent of the specified time period. The L_{50} represents the median sound level.

Ldn: The Day-Night Noise Level is the 24-hour day and night A-weighted noise exposure level that accounts for the greater sensitivity of most people to nighttime noise by weighting ("penalizing") noise levels by 10 dBA between 10:00 p.m. and 7:00 a.m.

CNEL: Similar to the Ldn, the Community Noise Equivalent Level adds a 5-dBA "penalty" for the evening hours, between 7:00 p.m. and 10:00 p.m., in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, or dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to sound is to compare the new noise environment with the existing environment to which one has adapted: the so-called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in the A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.

- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of both sound and the decibel system. Specifically, since the human ear perceives sound in a nonlinear fashion, the decibel scale was developed based on a logarithmic scale. As a result, two noise sources do not combine in a simple additive fashion, but rather combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise and Wildlife

The sensitivity and frequency responses of animal ears typically differ from those of the human ear. Animals are able to hear frequencies outside of the range of frequencies audible to humans. As a result, the noise descriptors used to characterize the ambient noise environment—which rely on the use of frequency A-weighting that emphasizes the mid-range frequencies that humans hear—do not adequately capture noise effects on wildlife. By extension, the ambient noise standards established to address noise impacts are based on human reactions to noise and do not accurately address noise impacts to wildlife. Therefore, this section does not consider noise impacts on wildlife; information on these impacts can be found in Section IV.D, Biological Resources.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles or construction equipment, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on environmental conditions (e.g., atmospheric conditions, presence of noise barriers). Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate, approximately 3 to 4.5 dBA.

Local Noise Environment

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure and the types of activities typically involved. In general, residences, hotels, schools, churches, and hospitals are more sensitive to noise than commercial and industrial land uses. While animals are also sensitive to noise, as noted earlier, the noise descriptors and standards used in this analysis apply only to humans and not wildlife. Therefore, in the context of this noise analysis, animals are not considered sensitive receptors. See Section IV.D, Biological Resources, for information about noise effects on wildlife. The closest sensitive receptor to Niles Dam is a residence approximately 1,600 feet to the northeast. Sunol Dam is approximately 450 feet to the southeast of a residence and is also in proximity to several plant nurseries. The

next nearest sensitive receptors to Sunol Dam are in the town of Sunol, approximately one mile to the east.

Noise Sources

The noise environment in the project area is dominated by motor vehicle traffic from State Route (SR) 84. Other sound sources that contribute to the ambient noise environment include planes flying overhead, rail traffic along the two railroad tracks in the area, and natural sounds such as birds, trees rustling in the wind, and Alameda Creek. There are no major stationary sources of noise in the area. Based on the traffic volumes and vehicle speeds on SR 84 described in Section IV.B, Transportation, Circulation, and Parking, maximum ambient noise levels 100 feet from vehicle traffic on SR 84 are estimated to range from 60 to 68 dBA during peak traffic periods. As traffic volumes decrease outside of the peak traffic periods, noise levels also drop off. Moreover, given noise attenuation and the fact that there are no other major noise sources in the area, noise levels away from SR 84 are noticeably lower.

Vibration Principles

Vibration is low-frequency mechanical energy transmission through air, soil, rock, or water. The energy transmission occurs because vibrating particles cause neighboring particles to move in a similar manner, affecting the particles next to them and so on. As such, vibration can be interpreted as energy transmitted as waves through the surrounding material. Vibration is measured in terms of peak particle velocity (ppv), typically expressed in units of inches per second (in/sec). The approximate minimum threshold for human perception of vibration is 0.008 in/sec. Examples of ppv from vibration sources include 0.012 in/sec from a passing heavy truck at 100 feet, 0.1 in/sec from a passing freight train at 100 feet, and 10 in/sec from a strong earthquake. Because energy is lost during the transfer of energy from one particle to another, energy waves and vibrations generally dissipate with distance from the vibration source.

The most common impacts from vibration include annoyance, damage to structures and/or equipment, disruption of vibration-sensitive operations or activities, and the triggering of landslides. While annoyance at residences tends to be associated with ppvs of 0.012 in/sec or greater, people may experience difficulties with routine office tasks at a ppv of 0.12 in/sec. The U.S. Bureau of Mines threshold criterion for avoiding any structural damage to buildings is a ppv of 2.0 in/sec, with possible minor structural damage to residential buildings resulting from a ppv of just over 4.0 in/sec (Siskind et al., 1980). Ground vibrations from most construction activities rarely reach the levels that can damage structures, but can achieve the audible and feelable ranges in buildings very close to construction sites (FTA, 1995). Certain activities such as pile driving, pavement breaking, blasting, and demolition of structures generate vibrations that are potentially damaging to buildings at distances of less than 25 feet from the source (Hendricks, 2002). At 50 feet, although vibrations are readily perceptible, they pose virtually no risk of damage to normal buildings.

Regulatory Framework

Title 24 Noise Insulation Standards

California has established noise insulation standards for new multifamily residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). Title 24 sets an interior standard of 45 Ldn in any habitable room and requires an acoustical analysis demonstrating how dwelling units have been designed to meet this standard when such units are proposed in areas subject to exterior noise levels greater than 60 Ldn. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

Impacts

Significance Criteria

The City of San Francisco has not formally adopted significance standards for noise impacts, but generally considers that implementation of the proposed project would have a significant noise impact if it were to:

- Substantially increase the ambient noise levels for adjoining areas;
- Violate Title 24 Noise Insulation Standards, if applicable; or
- Be substantially affected by existing noise levels.

In addition, given that the project would include the use of vibration-producing construction equipment, the proposed project would have a significant vibration impact if it were to:

- Expose people or structures to excessive groundborne vibration.

The proposed project does not include construction of any structures that would be subject to Title 24 Noise Insulation Standards (see discussion under Regulatory Framework). Therefore, impacts related to violations of Title 24 are not discussed further in this DEIR.

The proposed project would not include any permanent noise receptors that would be affected by existing noise levels. Therefore, impacts related to existing noise levels are not discussed further in this DEIR.

Impact Analysis

As described in more detail in Chapter III, Project Description, the proposed project would remove portions of Sunol and Niles Dams. Dam removal activities at both sites would occur between June and September 2006. Project activities would include diversion/dewatering of Alameda Creek, potential construction of access roads, dam removal, and site restoration.

Construction activities required to complete the project would generate temporary and intermittent noise at and near the two dams, with noise levels fluctuating according to the particular type, number, and duration of use of various pieces of construction equipment. Construction activities not associated with actual dam removal would require the use of excavators, bulldozers, backhoes, and/or loaders as well as trucks, pumps, generators, and an air compressor or jackhammer. An excavator fitted with a vibratory driving attachment would be used if sheetpiles are required. Table 12 shows typical noise levels at a distance of 50 feet produced by these types of construction equipment.

TABLE 12
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

	Noise Level (dBA, L_{eq} at 50 feet)	
Construction Equipment	**Without Noise Control**	**With Feasible Noise Control**
Earthmoving		
Front loaders	79	75
Backhoes	85	75
Dozers	80	75
Trucks	91	75
Stationary		
Pumps	76	75
Generators	78	75
Compressors	81	75
Impact		
Jack Hammers	88	75
Other		
Vibrators	76	75

SOURCE: U.S. Environmental Protection Agency, 1971

For all activities except dam removal, the construction equipment required would be expected to generate maximum noise levels of approximately 75 dBA at 50 feet with feasible noise controls.[2] Assuming the use of two pieces of equipment simultaneously, noise levels at 50 feet would be expected to reach nearly 78 dBA. These noise levels exceed ambient noise levels and therefore would be audible or noticeable to people in the area. At the same time, the distance between the nearest sensitive receptors and the dams, as well as the change in topography between them, would ensure that noise levels at these sites are attenuated to such a degree that construction noise would be indistinguishable from ambient noise. Moreover, construction work would be of limited

[2] The most prevalent noise source in construction equipment is the internal combustion engine, and among the most effective noise controls for engines are mufflers. This project includes the use of mufflers, as indicated by best management practice (BMP) 14 identified in the Initial Study (see Appendix A). BMP 14 states that internal combustion engines would be equipped with adequate mufflers. It should be noted that this BMP is included as an improvement measure to lessen noise levels rather than a mitigation measure. Mitigation measures are not required since construction noise would not violate any applicable standards.

duration, and construction noise is temporary and sporadic (rather than continuous). As such, noise impacts from all construction activities except dam removal would be less than significant.

Removal of portions of both dams would require the use of an excavator with a hydraulic hammer alone, or controlled blasting in addition to this excavator. A vibrating hammer breaking concrete produces a noise level of 113 dBA at 50 feet. Controlled blasting would require the sounding of warning horns (approximately 110 dBA at 50 feet), followed by blasting that would generate noise levels of approximately 138 dBA at 50 feet for a few seconds. Up to eight blasts might be necessary, conducted on up to eight different days. The actual controlled blast would last for a couple of seconds. As with other construction work, these noise levels exceed ambient noise levels in the immediate area and therefore would be audible or noticeable to people in the area. Despite the attenuation associated with the distance and change in topography between the nearest sensitive receptors and the dams, these activities would likely be clearly audible at these locations. At the same time, given the nature of construction work—in particular the fact that this work would be temporary and of limited duration—noise impacts to people from dam removal would be less than significant. Noise impacts from blasting would be minimal, since the number and frequency of blasts would be quite limited (i.e., one blast lasting a few seconds per blasting day for up to eight days of blasting). Given the nature of the noises associated with blasting (a warning horn followed by a loud blast), such noise may startle or otherwise frighten people passing by the area; however, this effect would be considered less than significant.

Construction activities could also generate vibrations in the project area that could affect nearby structures (e.g., SR 84, the rail lines) and occupants of surrounding buildings (i.e., the commercial nurseries and residence). Of particular concern is potential vibration impacts associated with removal of the dams. The activity with the greatest potential to produce vibration impacts would be the use of controlled blasting, which would generate a ppv of approximately 1.25 in/sec within 300 feet.[3] However, that the threshold of structural damage to buildings is a ppv of 2.0 in/sec, and the nearest structures to the dams are over 400 feet away; as such, the proposed project would not result in vibration impacts to structures. Moreover, while the vibrations associated with blasting might be felt by occupants of nearby buildings and by people in the area, given the limited number of blasts and the short duration of each blast (i.e., one blast lasting a few seconds on a given day, with a maximum of eight blasts during the three-week demolition period), any potential vibration impacts to people would be considered less than significant.

Lastly, construction-related material haul trips and construction worker trips could raise ambient noise levels along area roadways used to access both sites. Specifically, debris hauling from Sunol Dam would generate one truck trip per day, while debris hauling from Niles Dam could generate a maximum of two trips per day. Worker trips from both work sites would generate a total of 46 round-trips (i.e., 92 one-way trips) per day. Given the existing volumes of traffic on SR 84 and other area roadways, as described in Section IV.B, Transportation, Circulation, and

[3] While use of an excavator with a vibratory hammer to demolish the dams and use of an excavator fitted with a vibratory driving attachment to install sheetpiles (if required) would also generate vibrations, these vibrations would be less severe than the vibrations associated with blasting.

Parking, the addition of this limited number of construction-related vehicles would not result in a noticeable change in the existing ambient noise levels.

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I. Cumulative Environmental Effects

Statutory Guidance

Cumulative impacts, as defined in Section 15355 of the CEQA Guidelines, refer to two or more individual effects that, when considered together, are considerable or that compound or increase other environmental impacts. The cumulative impact from several projects is the change in the environment that results from the incremental impact of the project when added to other closely related past, present, or reasonably foreseeable future projects. Pertinent guidance for cumulative impact analysis is given in Section 15130 of the CEQA Guidelines:

- An EIR shall discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable" (i.e., the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary).
- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR.
- A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The discussion of impact severity and likelihood of occurrence need not be as detailed as for effects attributable to the project alone.
- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than attributes of other projects that do not contribute to the cumulative impact.

Approach

Two approaches to a cumulative impact analysis are discussed in CEQA Guidelines Section 15130 (b)(1): (1) the analysis can be based on a list of past, present, and probable future projects producing related or cumulative impacts, or (2) a summary of projections contained in an adopted general plan or related planning document can be used to determine cumulative impacts. For the purposes of this DEIR, the analysis employs the list-based approach. The following factors were used to determine an appropriate list of projects to be considered in this cumulative analysis:

- *Similar Environmental Impacts* – a relevant project contributes to effects on resources also affected by the proposed project
- *Geographic Scope and Location* – a relevant project is located within a defined geographic scope for the cumulative effect
- *Timing and Duration of Implementation* – effects associated with activities for a relevant project (e.g., short-term construction or demolition, or longer-term operations) would likely coincide in timing with effects of the proposed project

Similar Environmental Impacts

As summarized in Table 1 in Chapter I, Summary, the proposed project would have potential impacts in the following environmental areas: traffic, solid waste disposal (of sediments), biological resources, soil erosion, hydrology and water quality, historic and archaeological resources, and noise. The nature of the proposed project impacts can be summarized as follows:

Short-term, demolition-period effects (seven months in 2006):

- Traffic increases during dam removal (less than significant for the proposed project, but considered in the cumulative analysis) and traffic safety on State Route (SR) 84.
- Disposal of potentially hazardous sediments.
- Erosion and water quality effects in Alameda Creek in the Niles Canyon and Sunol Valley areas.
- Aquatic and riparian habitat and associated special-status species disturbance, and possible injury and mortality during demolition activities: California red-legged frog (CRLF), foothill yellow-legged frog, *O. mykiss*, Pacific lamprey, western pond turtle, dusky-footed woodrat, and plant species (large-flowered fiddleneck, showy Indian clover, Santa Clara red ribbons, big tarplant, and western leatherwood). Terrestrial habitat disturbance during dam removal activities.
- Potential disruption of breeding and nesting birds, raptors, and bats, including potential noise effects during dam removal activities on herons.

Longer-term or permanent effects of dam removal:

- Changes in flow regime, channel incision, slope and bank destabilization, sedimentation, and water quality effects in Alameda Creek. (Although each of these effects was found to be less than significant for the proposed project, the potential for cumulative effects in these areas is evaluated.)
- Aquatic and riparian habitat impacts in Alameda Creek related to loss of riparian vegetation and ponds adjacent to the Sunol Dam site due to the lowering of local groundwater levels following dam removal. Potential effects on CRLF if pond habitat is lost or reduced.
- Potential direct impacts to special-status plant species (large-flowered fiddleneck, showy Indian clover, Santa Clara red ribbons, big tarplant, and western leatherwood) if they are removed for equipment access, staging, or during demolition activities.
- Potential impacts to archaeological, historical, architectural, or paleontological resources.

Relevant projects in this cumulative analysis include those that could contribute incremental effects to the same environmental resources listed above.

Geographic Scope and Location

The geographic scope of this analysis, with respect to hydrology, water quality, and aquatic habitat, is the Alameda Creek watershed, both upstream and downstream. The main stem of Alameda Creek consists of four reaches:

- Flood Control Channel (lower 12 miles), which includes the Alameda County Water District (ACWD) Lower, Middle, and Upper Inflatable Dams and the BART weir
- Niles Canyon downstream of the Arroyo de la Laguna confluence,[1] which includes Niles and Sunol Dams and the passage barrier in Stonybrook Creek
- Sunol Valley where the creek forms a wide, braided channel over gravel deposits, which are subject to infiltration
- Upper Alameda Creek to the headwaters within the Alameda Creek watershed, including Calaveras Dam and the Alameda Creek Diversion Dam, which historically diverted the majority of upper Alameda Creek flows through a tunnel into Calaveras Reservoir

The geographic scope for direct effects of dam removal is not as extensive as that for creek-related effects; dam removal impacts would be more localized, and the narrow canyon topography and relatively undeveloped nature of the project vicinity would limit the number of potential sensitive receptors that would be subject to such impacts. Key impacts related to dam removal activities, listed above, such as traffic, noise, or erosion, are limited to the Niles Junction, Niles Canyon, and Sunol Valley areas northwest of I-680.

Timing and Duration of Implementation

The conceptual schedule for the proposed project calls for a six- to seven-month dam removal phase from May through November 2006; in-channel work would occur from June through October. Site restoration of disturbed areas is expected to immediately follow dam removal in late 2006 and early 2007. Revegetation would commence a year or two (2007–2008) following the completion of dam removal activities in the former backwater areas of Sunol and Niles Dams so that the area may stabilize before planting. In order to contribute to potential short-term effects associated with the dam removal activities, project construction or other activity would have to occur during the dam removal period.

List of Relevant Projects

Table 13 lists the past, present, and reasonably foreseeable projects and activities within the proposed project region, providing a brief description and anticipated schedule. The table also identifies the potential areas of cumulative effects (or the reasons that no cumulative effects are expected). Figure 24 shows the general location of these projects in relation to the proposed project sites. The potential for cumulative effects due to implementation of the proposed project in combination with the cumulative projects listed in Table 13 is discussed below.

[1] The confluence of Arroyo de la Laguna, a major tributary to Alameda Creek, is in the Sunol Valley. Arroyo del Valle and Arroyo Mocho are tributaries to Arroyo de la Laguna and receive runoff and regulated flow from Lake del Valle, a reservoir operated by the California Department of Water Resources to store Delta water imported via the South Bay Aqueduct.

TABLE 13
PROJECTS CONSIDERED FOR CUMULATIVE EFFECTS

Project Name / Sponsor Description	Schedule	Proximity to Project Sites	Areas of Potential Cumulative Effect
1. SFPUC Calaveras Dam Replacement			
Replace existing dam with new dam just downstream; restore capacity to 96,850 acre-feet. As part of this project, Calaveras Reservoir would be operated to release up to 6,300 acre-feet per year, or 5.5 million gallons per day (mgd), of water to Alameda Creek for fish flow enhancement.	2009–2011 Flow release after 2011	About 7+ miles upstream of Sunol Dam site and 10.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	Aquatic and riparian habitat and associated special-status species. Terrestrial habitat effects. Historical resources. No construction-related cumulative effects expected, as project sites are far enough apart geographically and project schedules are at least 3 years apart.
2. SFPUC Alameda Creek Fisheries Enhancement Project			
Install facilities downstream of Calaveras Reservoir within Alameda Creek to capture water released from the reservoir for fish flow enhancement and return it to the SFPUC regional water system for use.	Flow recapture after 2011	About 6.5 miles upstream of Sunol Dam site and 10 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	Aquatic and riparian habitat and associated special-status species. Terrestrial habitat effects. No construction-related cumulative effects expected, as project sites are far enough apart geographically and project schedules are at least 3 years apart.
3. SFPUC Additional 40-mgd Treated Water Supply			
Construct 40-mgd additional water treatment capacity at Sunol Valley Water Treatment Plant (WTP) (preferred site) or Harry Tracy WTP.	2010–2013	About 5 miles upstream of Sunol Dam site and 8.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	Terrestrial habitat effects. No in-creek activity or effects on creek flows or riparian habitat or associated species. No construction-related cumulative effects expected, as project sites are far enough apart geographically and project schedules at least 4 years apart.

TABLE 13 (continued)
PROJECTS CONSIDERED FOR CUMULATIVE EFFECTS

Project Name / Sponsor Description	Schedule	Proximity to Project Sites	Areas of Potential Cumulative Effect
4. SFPUC Sunol Valley WTP – New Treated Water Reservoir			
Construct a new 22.5-million-gallon storage reservoir for treated water at the Sunol Valley WTP plus associated pumping and pipe facilities.	2008–2010	About 5 miles upstream of Sunol Dam Site and 8.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	Terrestrial habitat effects. No construction-related cumulative effects expected, as project sites are far enough apart geographically and project schedules are at least 3 years apart.
5. SFPUC New Irvington Tunnel / Alameda Siphons Project			
Construct a second tunnel to convey water from Sunol Valley to Fremont and a fourth siphon across Sunol Valley and Alameda Creek.	2009–2012	About 4 miles upstream of Sunol Dam Site and 7.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	Jack-and-bore construction under creek; no in-creek activity or long-term effects on creek flows or riparian habitat or associated species. Terrestrial habitat effects. No construction-related cumulative effects expected, as project sites are far enough apart geographically and project schedules at least 3 years apart.
6. SFPUC San Antonio Pump Station Upgrade			
Upgrade and rehabilitate existing pump station to meet seismic requirements; replace three electrical pumps and provide backup for each; and upgrade and possibly expand the electrical substation.	2009–2011	About 4 miles upstream of Sunol Dam site and 7.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	No in-creek activity or effects on creek flows or riparian habitat. Potential short-term terrestrial habitat disruption. No construction-related cumulative effects expected, as project sites are far enough apart geographically and project schedules at least 3 years apart.
7. SFPUC Adit Leak Repair – Calaveras Reservoir			
Repair leaking adits (outlet) structure in outlet tower used to control withdrawal of water from Calaveras Reservoir. Work conducted from within outlet tower.	2007	About 7+ miles upstream of Sunol Dam site and 10.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	None expected. Project activities contained within Calaveras Reservoir and within the outlet tower; only minor, short-term physical effects.

TABLE 13 (continued)
PROJECTS CONSIDERED FOR CUMULATIVE EFFECTS

Project Name / Sponsor Description	Schedule	Proximity to Project Sites	Areas of Potential Cumulative Effect
8. SFPUC Calaveras Interim Operations – Oxygenation System			
Upgrade the existing oxygenation system to improve the interim operation of and water quality in the Calaveras Reservoir under its current restricted storage level.	2005	About 7+ miles upstream of Sunol Dam site and 10.5 miles upstream of Niles Dam site on Alameda Creek. Southeast of I-680.	None expected. Project activities contained within Calaveras Reservoir; only minor, short-term physical effects.
9. SFPUC Alameda Watershed Management Plan and Habitat Conservation Plan (HCP)			
Plan established a program for watershed management activities including: road and bridge maintenance and construction, vegetation management, pond spillway repair, recreation activity improvements, reservoir operations and maintenance, prescribed burns (for vegetation management), water system operations, livestock grazing, nurseries operations and maintenance, and creek restoration activities such as channel realignment and floodplain restoration.	30-year implementation period beginning after completion of HCP, now in progress. Possible completion in 2008.	Surrounds the Niles Canyon project region	Alameda Creek aquatic and riparian habitat and associated special-status species. Construction-related: traffic safety, erosion, water quality.
10. Caltrans SR 84 Safety Project			
Roadway improvements along Niles Canyon Road (SR 84) between Rosewarnes Bridge (MP 12.1) and Farwell Bridge (MP 13.3), including widening existing road shoulders, improving site distance and vertical clearances at bridges, providing a northbound left-turn pocket at Palomares Road and relocating the intersection, installing a retaining wall along a section of the creek, and replacing the box culvert.	CEQA review in progress. Construction possible between 2006 and 2008.	Niles Dam is at MP 12.8 within the roadway improvement reach.	Construction-related effects: traffic safety, erosion. Riparian habitat and aquatic habitat and associated special-status species. Terrestrial habitat.

TABLE 13 (continued)
PROJECTS CONSIDERED FOR CUMULATIVE EFFECTS

Project Name / Sponsor Description	Schedule	Proximity to Project Sites	Areas of Potential Cumulative Effect
11. Chevron Pipeline Relocation and Watershed Protection Project			
Relocate approximately 7.5-mile pipeline segment through Sunol Valley area to replace existing pipeline near San Antonio Reservoir and reduce risk of water supply impact in the event of pipeline rupture/leak. New pipeline segment to start in Livermore and connect with existing pipeline at Calaveras Road near San Antonio Creek. Abandon existing pipeline segment in place.	Unknown – potential for 2006 construction	About 3 miles upstream of Sunol Dam site and 6.5 miles upstream of Niles Dam site. Southeast of I-680.	Terrestrial habitat. No in-creek activity or effects on creek flows or riparian habitat. No construction-related cumulative effects expected, as project sites are far enough apart geographically.
12. Mission Valley Rock (MVR) Company Quarries – Surface Mining Permits (SMP) 24, 32, and 33			
MVR SMP-24 – 202-acre quarry and processing operation. Recent permit revision allows increased aggregate extraction from the quarry by deepening the existing pits from 140 feet to as much as 250 feet; no expansion of quarry footprint. MVR SMP-32 – Permit for new quarry operations on 240 acres (including 69-acre former SMP-29). Quarried materials would be processed at SMP-24. MVR SMP-33 – 31-acre quarry. Recent permit revision allows for deepening of the existing pit from 140 feet to as much as 200 feet, and footprint expansion by 6 acres to the east for a total of 37 acres. Quarried materials continue to be processed at SMP-24.	Activity ongoing. Quarrying at SMP-32 to begin in 2009.	About 2 miles upstream of Sunol Dam site and 5.5 miles upstream of Niles Dam site. Southeast of I-680.	Groundwater. No cumulative effects related to traffic, noise, or erosion are expected, since project sites are far enough apart geographically.
13. Sunol Valley Aggregate Quarry – SMP 30			
308.5-acre quarry – continued mining under current permit in the near term, with planned expansion to increase mining depth from 140 feet to approximately 225 feet, plus restoration of portions of the Alameda Creek and San Antonio Creek banks and installation of a slurry cutoff wall.	Near-term continuation of quarry operations. Expansion of quarry and other activities in 2009–2011.	About 2 miles upstream of Sunol Dam site and 5.5 miles upstream of Niles Dam site. Southeast of I-680.	Groundwater. Installation of the slurry cutoff wall expected to benefit creek flow hydrology by reducing seepage to the quarry pits; no adverse impact to creek flows expected. Planned creek bank restoration would also provide a benefit to riparian habitat. No cumulative effects related to traffic, noise, or erosion are expected, since project sites are far enough apart geographically.

TABLE 13 (continued)
PROJECTS CONSIDERED FOR CUMULATIVE EFFECTS

Project Name / Sponsor Description	Schedule	Proximity to Project Sites	Areas of Potential Cumulative Effect
14. Alameda County Water Management Authority Organics Composting			
Construction and operation of a green waste composting facility.	2006–2007	About 3 miles upstream of Sunol Dam site and 6.5 miles upstream of Niles Dam site. Southeast of I-680.	Terrestrial habitat. No in-creek activity or effects on creek flows or riparian habitat. No construction-related cumulative effects expected, as project sites are far enough apart geographically.
15. Army Corps of Engineers – Section 1135 Alameda Creek Flood Control Project Fish Passage Modifications			
Study of potential structural impediments to fish passage within flood control channel. Local sponsor is Alameda County Flood Control and Water Conservation District. Study concepts include potential fishways at BART weir and Middle and Upper Alameda County Water District Inflatable dams and four fish screens at Shinn Pond Diversion 1, 2, Kaiser Pond Diversion, and Alameda Creek Pipeline Intake.	Detailed project report to be completed by 2006. Project schedule unknown.	About 1.25 miles downstream of Niles Dam Site and 4.75 miles from Sunol Dam site	Potential temporary construction effects on Alameda Creek aquatic and riparian habitats and associated special-status species.
16. Army Corps of Engineers – Arroyo de la Laguna Flood Control and Restoration			
Reconnaissance study completed in 2004 to assess federal interest in solutions to potential flooding and associated damage to surrounding riparian habitat.	Unknown. Additional studies and funding authorization needed.	About 1.25 miles upstream of the Sunol Dam site. Arroyo de la Laguna drains the Livermore Valley region to Alameda Creek.	Construction erosion, water quality, habitat disturbance. Project schedule unknown; likely to occur years after proposed project.
17. Zone 7 Water Agency – Stream Management Master Plan, Reach 10 Improvements			
Master plan contains 49 projects to be implemented over 20 years throughout Zone 7 service area in the Tri-Valley Area. Reach 10 includes Arroyo de la Laguna; proposed activities include bank stabilization and protection features, grading and terracing of eroded banks, riparian corridor enhancement for 3,000 feet, and removal of barriers to steelhead fish migration.	Targeted for implementation before 2010	About 1.25 miles upstream of the Sunol Dam site. Arroyo de la Laguna drains the Livermore Valley region to Alameda Creek.	Construction erosion, water quality, habitat disturbance. Project schedule unknown; likely to occur years after proposed project

SOURCES: Agency consultation and review of available documentation

Cumulative Effects

The following discussion reviews each impact of the proposed project and evaluates the potential for cumulative effects with any of the other projects and activities listed in Table 13. Where there is the potential for cumulative effects, the following sections provide an assessment of whether the project's incremental contribution to the effect would be cumulatively considerable. If appropriate, mitigation measures are identified to address cumulative effects.

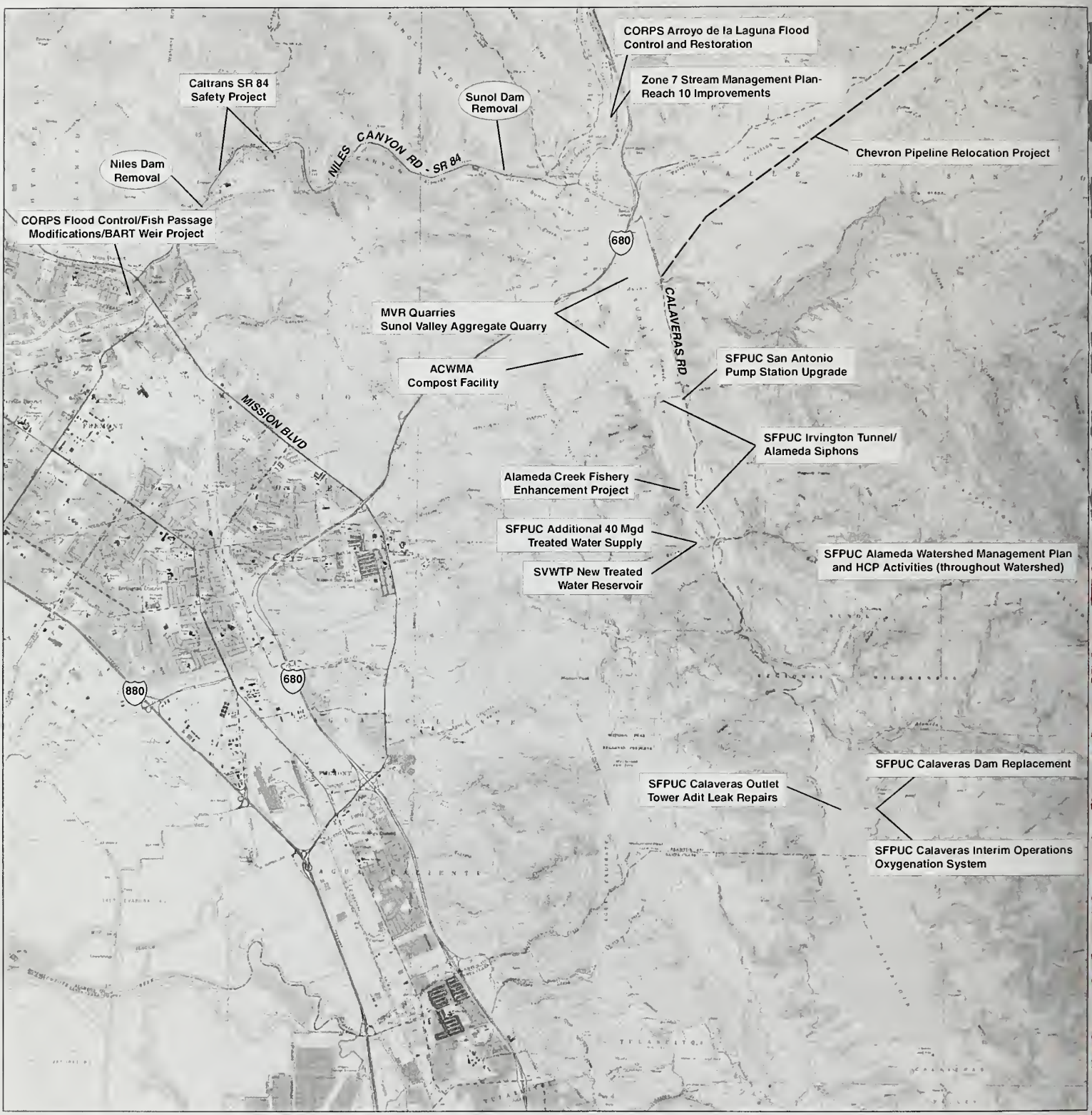
Traffic

The proposed project would generate a minor amount of traffic on SR 84 during the demolition process (approximately two to three truck trips per day for work at both dam sites), resulting in a less-than-significant traffic impact on SR 84 (see Section IV.B, Transportation, Circulation, and Parking). As shown on Figure 24, most of the other projects in the region are over two miles southeast of the Sunol Dam site, in the Sunol Valley area southeast of I-680. Project construction and operation traffic accessing these other project sites would use I-680 and not SR 84. As a result, most of these projects do not have the potential to contribute to cumulative traffic effects in association with the proposed project. The Caltrans SR 84 Safety Project would occur along SR 84 in the same vicinity as the project. The proposed project would generate such a minor amount of traffic that it would not be cumulatively considerable, even if the Caltrans project occurred in this area at the same time.

The proposed project poses a potentially significant traffic safety concern because of truck traffic accessing the Niles Dam site from SR 84. If the Caltrans SR 84 Safety Project were to occur at the same time as the proposed project, a cumulative effect on SR 84 traffic flow and safety could result. Mitigation Measure B-1 would reduce project impacts by restricting construction vehicles to nonpeak traffic hours and implementing appropriate traffic control and warning systems such that the impact would not be cumulatively considerable. In addition, Mitigation Measure I-1 would further reduce the potential for cumulative effects on SR 84 traffic flow and safety.

Solid Waste / Materials Disposal

While available information indicates that sediments to be removed from the two dam sites are clean and suitable for reuse, it is possible that some sediments with hazardous materials content might be encountered and require proper disposal in an appropriately permitted facility (see Section IV.C, Utilities and Public Services). The proposed project incorporates mitigation requiring the collection and testing of additional samples of materials removed from the dam sites before off-hauling to determine appropriate disposal or reuse. The amount of material to be removed does not present a significant impact in terms of disposal capacity. The proposed project does not make a cumulatively considerable contribution to the amount of material that might require disposal. The Caltrans SR 84 Safety Project might also require disposal of potentially hazardous materials, but does not propose major excavation or removal of soils or other materials from the area. For other SFPUC projects in the Sunol Valley and further upstream in the Alameda Creek watershed, the SFPUC is considering disposal sites within the immediate project areas for clean fill and does not


CORPS Arroyo de la Laguna Flood Control and Restoration
Zone 7 Stream Management Plan-Reach 10 Improvements
Caltrans SR 84 Safety Project
Sunol Dam Removal
NILES CANYON RD - SR 84
Chevron Pipeline Relocation Project
Niles Dam Removal
CORPS Flood Control/Fish Passage Modifications/BART Weir Project
680
CALAVERAS RD
MVR Quarries Sunol Valley Aggregate Quarry
ACWMA Compost Facility
SFPUC San Antonio Pump Station Upgrade
MISSION BLVD
SFPUC Irvington Tunnel/ Alameda Siphons
Alameda Creek Fishery Enhancement Project
SFPUC Additional 40 Mgd Treated Water Supply
SFPUC Alameda Watershed Management Plan and HCP Activities (throughout Watershed)
SVWTP New Treated Water Reservoir
880
680
SFPUC Calaveras Dam Replacement
SFPUC Calaveras Outlet Tower Adit Leak Repairs
SFPUC Calaveras Interim Operations Oxygenation System
0
2
Miles
Proposed Project
Other Projects

SOURCE: ESA, 2005

Sunol-Niles / 201591

Figure 24

Projects Considered in Cumulative Effects Evaluation

anticipate the need to excavate significant quantities of hazardous soils, given the undeveloped nature of most of the project sites within the watershed.

Biological Resources – Habitat and Species Disturbance During Demolition

Riparian and Aquatic Habitats

The proposed project has the potential for significant impacts to riparian and aquatic habitat and associated special-status plant and animal species (see Section IV.D, Biological Resources). Mitigation Measures D-1 through D-10, along with other measures proposed as part of the project to avoid and minimize impacts and restore habitat after dam removal, would reduce project effects to a less-than-significant level. The proposed project is scheduled for implementation in 2006, before the other cumulative projects. With implementation of mitigation measures, the short-term disruption to habitat conditions and species would be reduced to less than cumulatively considerable before or by the time the other projects are implemented.

The cumulative projects listed in Table 13 could also generate short-term impacts to creek habitats and associated species; these projects would be required to implement mitigation measures to avoid or minimize such impacts and to restore habitats following construction. Projects that include work in and adjacent to the creek and that could also result in short-term aquatic and riparian habitat and species impacts during construction include: the Caltrans SR 84 Safety Project, the U.S. Army Corps of Engineers (Corps) Alameda Creek Flood Control Project, and the SFPUC's Calaveras Dam Replacement Project, the Alameda Creek Fisheries Enhancement Project, and Alameda Watershed Management Plan activities for creek restoration. For the Alameda Watershed Management Plan, the SFPUC is currently preparing a habitat conservation plan in compliance with Section 10 of the Federal Endangered Species Act to avoid or mitigate potential impacts to special-status species.

The Chevron Pipeline Relocation and Watershed Protection Project and the SFPUC's Additional 40-mgd Treated Water Supply Project, Sunol Valley Water Treatment Plant (WTP) – Treated Water Reservoir Project, and Irvington Tunnel / Alameda Siphons Project do not involve construction activities in the creek. The Chevron project comes near but would not cross Alameda Creek. For the Irvington Tunnel / Alameda Siphons Project, a new siphon would be installed under Alameda Creek with jack-and-bore or other trenchless technique to avoid work directly in the creek.

Some of the projects on Alameda Creek are intended to improve aquatic habitat conditions in the creek for fishery resources; these include the proposed project, the SFPUC's Calaveras Dam Replacement Project and Alameda Creek Fisheries Enhancement Project, the creek bank restoration planned as part of future operations of the Sunol Valley Aggregate Quarry, creek restoration elements of the SFPUC's Alameda Watershed Management Plan, and the Corps' Alameda Creek Flood Control Project. Upstream in Arroyo de la Laguna, Zone 7 and the Corps projects are also intended to benefit riparian and aquatic habitats. In addition, the Watershed Management Plan identifies Alameda Creek restoration activities to be implemented over several

years to continue improvement of fishery and habitat resources. In aggregate, these projects are expected to have a cumulative beneficial effect on creek habitat and species.

Terrestrial Habitats

The proposed project would result in some temporary impacts to terrestrial habitats and associated plant and animal species during dam removal activities due to installation and removal of access roads, staging areas, and equipment moving. The project would affect grassland/upland and result in some tree removal, primarily within the riparian zone. There is an area of Alameda whipsnake habitat near the Niles Dam removal area but, as discussed in Section IV.D, Biological Resources, this area is not expected to be affected by the project. The project would have a limited effect on terrestrial habitats, and mitigation identified for the project would reduce the project's contribution to effects on terrestrial vegetation and habitats to a level that is less than cumulatively considerable.

Other projects that could affect terrestrial vegetation include the SFPUC's Calaveras Dam Replacement, Additional 40-mgd Treated Water Supply Project, Sunol Valley WTP – New Treated Water Reservoir Project, Irvington Tunnel / Alameda Siphons Project, and San Antonio Pump Station Upgrade, the Caltrans SR 84 Safety Project, the Chevron Pipeline Relocation Project, the Sunol Valley Aggregate Quarry for slurry cutoff wall installation (and if processing facilities are relocated), and the Alameda County Water Management Authority's Organics Composting Project. Each of these projects is required to, or will be required to mitigate for impacts to terrestrial habitats as well.

Biological Resources – Longer-Term Habitat Effects

The proposed project would lower groundwater levels in the immediate vicinity of the Sunol Dam site once the dam is removed. This lowering of the groundwater level might affect riparian vegetation as well as reduce water in adjacent ponds that provide potential breeding habitat for CRLF. The groundwater level would lower gradually over a period of a year or more after Sunol Dam removal, and the riparian vegetation is expected to adapt to the changes. Mitigation is proposed (Measure D-9) to monitor the effects on riparian vegetation in this area and to provide for active restoration if passive restoration of the riparian vegetation does not occur. With mitigation (if necessary), the proposed project would not result in significant permanent loss of riparian vegetation. Similarly, it is possible that dam removal could improve aquatic breeding habitat for CRLF elsewhere along the creek, compensating for the potential reduction of habitat in the adjacent ponds affected by the lower groundwater level. Mitigation Measure D-4a would provide for habitat compensation if restoration does not occur naturally as the creek readjusts following dam removal. With mitigation, the proposed project would maintain no net loss of riparian vegetation and CRLF breeding habitat and therefore would not contribute to a significant cumulative effect on these resources.

The Mission Valley Rock (MRV) Company Quarries and the Sunol Valley Aggregate Quarry projects do not involve groundwater dewatering activities that remove groundwater from the quarry site. Typically, slurry walls are constructed within the pit to keep groundwater out of the area of gravel extraction. If needed, accumulated groundwater is removed from the extraction

area and diverted to an adjacent pit area. MVR manages its quarry operations to minimize impacts to groundwater levels. Existing quarry operations have not notably reduced groundwater levels in the area, and expanded operations are also not expected to do so. These projects would not result in a cumulative effect on groundwater levels in conjunction with the proposed project. Installation of slurry cutoff walls to reduce seepage of creek flows into the quarry areas would be required as part of future operations for the Sunol Valley Aggregate Quarry. In addition, creek bank restoration would also be required as part of this future quarry operation. Both of these requirements would help improve flow conditions and riparian habitat within the creek.

Other projects that might have the potential to result in permanent impact to riparian habitat and/or CRLF breeding habitat include those that also propose work in or immediately adjacent to the creek: the Caltrans SR 84 Safety Project, the Corps' Alameda Creek Flood Control Project, and the SFPUC's Calaveras Dam Replacement Project, Alameda Creek Fisheries Enhancement Project, and Alameda Watershed Management Plan activities for creek restoration. Each project would be required to implement mitigation measures for impacts to riparian vegetation and/or CRLF breeding habitat. For the Alameda Watershed Management Plan, the SFPUC is currently preparing a habitat conservation plan in compliance with Section 10 of the Federal Endangered Species Act to avoid or mitigate potential impacts to special-status species.

Erosion / Water Quality Effects

The proposed project would disturb soils and sediments in and adjacent to Alameda Creek and generate short-term erosion and water quality effects to the creek during dam demolition, as discussed in Section IV.E, Geology, Soils, and Seismicity, and Section IV.F, Hydrology, Groundwater, and Water Quality. Mitigation Measures E-1, and F-1a, F-1b, and F-1c, along with BMPs for channel diversion/dewatering and water quality protection proposed as part of the project, would minimize the proposed project impacts, to less than significant. These measures and BMPs are intended to reduce the proposed project's effects to less than cumulatively considerable.

The Caltrans SR 84 Safety Project involves earthwork and construction activities in and adjacent to Alameda Creek near the Niles Dam site, and, together with the Corps' Alameda Creek Flood Control Project site just downstream, these two projects have the potential to generate cumulative erosion and creek water quality effects in conjunction with the proposed project. The Caltrans and Corps projects would be required to incorporate similar erosion control and water quality protection measures, which would be enforced by the Regional Water Quality Control Board. These other projects would not likely occur at the same time as the proposed project and thus would not contribute to cumulative construction-related erosion or water quality effects.

Projects upstream of the Sunol Dam site in the Arroyo de la Laguna area (Zone 7's Stream Management Master Plan Reach 10 Improvements and the Corps' Flood Control Project) would involve work in and adjacent to the creek. However, there is no firm schedule for either of these projects, and they are not expected to occur at the same time as the proposed project. Therefore, no short-term cumulative erosion effects would result from these projects. The Chevron pipeline project would occur near but would not cross Alameda Creek. Most of the other SFPUC projects

would not involve work in the creek, but could indirectly cause erosion to the creek during construction periods. The SFPUC's Alameda Creek Fisheries Enhancement Project would involve some construction of water recapture facilities in the creek. These projects are all geographically removed from the Sunol and Niles Dam sites, ranging from two to seven miles upstream of the Sunol Dam site. In addition, these projects are scheduled for construction after the 2006 proposed project activities and thus are not expected to contribute to cumulative erosion and water quality impacts in conjunction with the project.

Hydrology / Geomorphology

As discussed in Section IV.F, Hydrology, Groundwater, and Water Quality, the proposed project would not result in a significant effect on the creek channel such that it would alter the flow regime, channel stability, long-term sedimentation, or water quality in the creek. As part of the SFPUC's Alameda Watershed Management Plan, creek restoration activities have been identified for potential implementation over several years. These activities could include channel realignment and floodplain restoration, but no specific project plans have been developed. Design objectives for such creek restoration efforts include stabilizing the channel, improving creek flow for fishery and aquatic resources, and contributing to beneficial rather than adverse impacts in the creek. The other projects considered in this cumulative evaluation do not propose channel modification. The proposed project would not make a cumulatively considerable contribution to effects on channel geomorphology or stability or on creek flows.

As part of the future Sunol Valley Aggregate Quarry operations, a slurry cutoff wall would be installed to reduce seepage of Alameda Creek flows into the quarry area. This project would thus increase flow conditions in the creek and improve fisheries habitat in this area.

Historical Resources

As discussed in Section IV.G, Historical Resources, the proposed project would have a significant and unavoidable effect on historical resources by demolishing the two historical dams, each considered notable for different reasons. Mitigation Measures G-1a and G-1b would document these resources prior to demolition, but would not reduce this impact to less than significant. Other SFPUC projects could affect additional historical resources that are components of the regional water system. In particular, the Calaveras Dam Replacement Project would involve demolition and replacement of the Calaveras Dam, also a historic resource (see Section IV.G for further discussion). Because Calaveras Dam represents a different historical period than Sunol or Niles Dam and is considered important for other reasons than those that apply to Sunol and Niles Dams, replacement of Calaveras Dam in conjunction with demolition of Sunol and Niles Dams would not result in a cumulative impact to historical resources.

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CHAPTER V
Mitigation Measures

This chapter describes proposed mitigation measures for the significant and potentially significant environmental impacts identified in Chapter IV, Environmental Setting and Impacts, as required under the California Environmental Quality Act (CEQA). As described below, implementation of mitigation measures would reduce most of the identified impacts to a less-than-significant level. The following types of mitigation measures are identified:

- Measures proposed as part of the project. The San Francisco Public Utilities Commission (SFPUC) incorporated these mitigation measures into the project. These measures were previously identified in the Initial Study prepared for this project (see Appendix A).

- Measures identified in this report. These mitigation measures are not included in the project, but could reasonably be expected to reduce the adverse impacts of the project if required as conditions of project approval. These measures are designed to ensure that project impacts are avoided or reduced to a less-than-significant level, if feasible.

Implementing mitigation measures would reduce impacts to a less-than-significant level, except where otherwise noted. Where mitigation would not reduce impacts to a less-than-significant level, see Chapter VI, Significant Environmental Effects that Cannot Be Avoided, and Chapter VII, Significant Irreversible Environmental Changes. If the mitigation measures are not adopted by the SFPUC (i.e., due to funding or technological feasibility), the SFPUC would need to adopt a finding of overriding considerations before implementing actions that could result in significant impacts, unless subsequent analysis demonstrated that a significant impact would not occur. The SFPUC would need to make a finding of overriding considerations for those impacts that cannot be mitigated.

In addition to mitigation measures, this chapter describes recommended improvement measures for some impacts that were identified as less than significant in Chapter IV, Environmental Setting and Impacts. Improvement measures were identified as a result of the analysis contained herein. These improvement measures, while not required under CEQA to mitigate identified significant impacts, could reduce minor adverse effects or temporary disruption associated with implementation of the proposed project.

Compatibility with Existing Zoning and Plans

No significant or potentially significant impacts were identified, and no mitigation is required.

Transportation, Circulation, and Parking

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified a best management practice (BMP)[1] for traffic control. The measure is as follows:

> Construction signs would be posted at job sites warning the public of construction work and to exercise caution. When necessary, a person would be provided for traffic control. A lane may be blocked off to allow for trucks to pull into and out of the access points.

Mitigation Measures Identified in this DEIR

The mitigation measure focuses on reducing short-term traffic impacts during dam demolition activities; mitigation measures for long-term impacts are not needed.

B-1 The SFPUC will prepare and implement a traffic control plan in coordination with Caltrans and the City of Fremont for all affected roadways and intersections. The traffic control plan will comply with the requirements outlined in Caltrans and City of Fremont encroachment permits. The traffic control plan will include, but not be limited to, the following measures:

- The SFPUC will install advance warning systems and flaggers on SR 84 at the access points. At Sunol Dam, the flaggers will create gaps in traffic to allow trucks to pull out of the nursery driveway, where sight-distance would be an issue. At Niles Dam, the flaggers will limit traffic to one-way flag controlled traffic to allow sufficient width for trucks to pull on and off of the roadway.
- The SFPUC will schedule project work and restrict construction vehicles to nonpeak traffic periods (i.e., 9:00 a.m. to 4:00 p.m. and 8:00 p.m. to 4:00 a.m.) to avoid peak-hour traffic on SR 84.
- The SFPUC will install advance warning signs and speed controls on SR 84 to achieve required speed reductions for safe traffic flow past the dam access points.
- The SFPUC will include advance warning signs and/or detours for bicyclists near the dam access points on SR 84.
- The SFPUC will install advance warning signs if blasting is used. Traffic may be stopped temporarily when blasting occurs.

[1] In addition to mitigation measures, BMPs are also included in some of the mitigation measures. BMPs are standard methods, measures, or practices such as structural and nonstructural controls or operation and maintenance procedures. The BMPs noted herein should be viewed as a menu of options from which the SFPUC may select to address a particular set of problems. In addition, other BMPs may be employed by the SFPUC to address site-specific demolition effects; therefore, not all of the possible BMPs are listed.

Improvement Measures

The following measure is recommended to further reduce the less-than-significant impact of wear and tear on access points.

> The SFPUC will inspect roadways affected by the project prior to and after demolition and, if roadway damage is detected, enter into an agreement with local jurisdictions for implementing a post-construction roadway repair/rehabilitation program. At a minimum, roads damaged by demolition activities will be repaired to a structural condition equal to that, which existed prior to demolition activity.

Utilities and Public Services

The mitigation measure identified below would reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 32) identified the following mitigation measure:

> Additional samples will be collected from the excavated/stockpiled materials[2] and tested[3], before off-hauling any of the materials. The final destination of the materials will depend on the results of the additional testing.

Mitigation Measures Identified in this DEIR

No additional significant or potentially significant impacts have been identified, and no mitigation is proposed.

Biological Resources

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified BMPs for fishery and aquatic resources. These measures are as follows:

> Temporary fills, such as for access ramps, diversion structures, or cofferdams, will be completely removed upon finishing the work.

> Pump intakes are screened with mesh equal to or less than 3/16 inch to prevent uptake of fish or frogs.[4]

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[2] The "materials" to be sampled is the sediment removed from behind the dams for off-hauling.

[3] [3] Samples will be analyzed for gasoline, diesel, motor oil, semi-volatile organics, pesticides, PCBs and Cam 17 metals.

In general, work is performed from the spring to fall months when low flows are present in the channels. Work is typically completed by October 15 of any year unless permission from the California Department of Fish and Game (CDFG) is received allowing work to continue past this date. By performing work during this period, effects to water quality and aquatic habitats are avoided or minimized.

The Initial Study (see Appendix A, p. 32) identified the following mitigation measure:

Post-project revegetation will replace the Alameda whipsnake habitat disturbed during dam removal activities.[5]

Mitigation Measures Identified in this DEIR

D-1 **Measure to protect special-status plants.** Before clearing and grubbing activities occur within the project area, a qualified botanist will perform appropriately timed botanical surveys to determine the presence or absence of special-status plant species. If special-status plants are discovered in the project area, individuals will be clearly marked and avoided during dam removal to the extent feasible. Otherwise, the SFPUC will obtain the necessary permits for impacts to the plant species.

D-2a **Avoidance of jurisdictional features.** The final design will avoid temporary and permanent impacts to jurisdictional features to the extent feasible. If avoidance is infeasible, implementation of Measures D-2b through D-2e would reduce the impacts to a less-than-significant level.

D-2b The SFPUC will implement standard BMPs to maintain water quality and control erosion and sedimentation. See "Mitigation Measures Proposed as Part of the Project" under Hydrology, Groundwater, and Water Quality, below.

D-2c Dam removal activities within jurisdictional features will require permit approval from the U.S. Army Corps of Engineers (Corps) for fill of wetlands and other waters of the U.S. pursuant to Section 404 of the Clean Water Act (CWA). Water quality certification from the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) will also be required pursuant to Section 401 of the CWA. In addition, the CDFG has jurisdiction pursuant to Section 1602 of the Fish and Game Code. Dam removal work at Sunol and Niles dams will require a Streambed Alteration Agreement from the CDFG. Terms and conditions of the permits will include measures to protect and maintain water quality, restore worksites, and mitigate for temporary and permanent wetland impacts.

D-2d The SFPUC will restore all jurisdictional features temporarily disturbed during dam removal activities to pre-project conditions, as described in the Corps-verified wetland delineation map and report. A qualified biologist/ecologist will prepare a wetland mitigation and monitoring program to be reviewed and approved by the Corps and

[4] Screen size is based on criteria from the National Marine Fisheries Service (1997).
[5] This mitigation measure is for Niles Dam.

SFBRWQCB. Monitoring of restored areas will be required for a minimum of five years. The wetland mitigation and monitoring program will include specific performance criteria, monitoring methods, timing of annual reports, and conditions for remedial action if plan criteria are not met. SFPUC will be responsible for ensuring that the restoration plan is implemented.

D-2e The SFPUC will replace all jurisdictional features permanently disturbed during dam removal activities through compensatory mitigation. The final ratio will be negotiated by resource agencies and specified in regulatory permits issued for the project.

D-3 **Measures to reduce impacts to *O. mykiss* and Pacific lamprey.** The SFPUC will implement the following measures to reduce direct and indirect impacts to *O. mykiss* and Pacific lamprey:

Before dam removal activities commence, the following measures will be implemented:

- Before diversion/dewatering and dam removal activities, a NMFS-approved biologist will conduct fish relocation activities, and immediately release captured fish to a suitable habitat near the project site.

- A plan describing pre-project conditions and restoration methods of disturbed areas will be prepared by a qualified biologist, reviewed and approved by the CDFG (see Mitigation Measure D-9a).

During dam removal activities, the following measures will be implemented:

- In-stream dam removal activities will be restricted to low-flow periods (May through October) unless authorized by the NMFS.

- Sediment curtains will be placed downstream of the dam-removal area to prevent sediment, which could be disturbed during diversion/dewatering and dam removal activities, from being transported and deposited outside of the project area.

- Dewatering pumps will be screened according to NMFS fish screening criteria for anadromous salmonids (NMFS, 1997). A qualified biologist will be onsite during initial dewatering activities to ensure that any fish that may have remained within the project area are relocated to suitable habitat near the project area.

- Silt fencing will be installed in all areas where construction occurs within 100 feet of known or potential *O. mykiss* and Pacific lamprey habitat.

- A spill prevention plan for potentially hazardous materials will be prepared and implemented by the SFPUC. The plan will include proper procedures for handling and storing potentially hazardous materials, as well as for cleaning up and reporting any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channel.

- Most equipment and materials will be stored at least 50 feet from Alameda Creek and the bypass channel, if one is constructed. If equipment and/or materials are to be left within Alameda Creek at the end of a workday or over a weekend during

demolition activities, temporary containment berms will be constructed around such equipment and/or materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents will be located outside of the stream channel and banks. Stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the stream will be positioned over drip pans or excavated areas with plastic lining to contain potential spills. Any equipment or vehicles driven or operated within or adjacent to Alameda Creek will be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life. Vehicles will be moved at least 50 feet away from the stream before refueling and lubrication, when feasible. No debris such as trash and spoils will be deposited within 50 feet of Alameda Creek, the bypass channel, or wetlands.

- Proper and timely maintenance for vehicles and equipment used during dam removal activities will be performed to reduce the potential for mechanical breakdowns to lead to a spill of materials into or near the creek. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creek).

- A qualified biological monitor will be onsite during all diversion/dewatering activities. The biological monitor will advise the resident engineer to halt construction if impacts on *O. mykiss* or Pacific lamprey are evident.

After dam removal activities are completed, the following measures will be implemented:

- The SFPUC will restore areas disturbed during dam removal activities with an appropriate assemblage of native vegetation suitable for the area. Channel banks will be returned to original grade slope, and appropriate bank stabilization techniques will be implemented to reduce the potential for erosion and sedimentation (se Mitigation Measure D-9a).

D-4a **Measures to minimize and avoid impacts on California red-legged frog and foothill yellow-legged frog habitat.** Measures to minimize and avoid the incidental take of California red-legged frog (CRLF) are derived from the Programmatic Biological Opinion (PBO) for impacts to CRLF (USFWS, 1999) and will also provide suitable protection to foothill yellow-legged frogs. Although it is unlikely that the project will be covered under the PBO, the PBO summarizes typical effects that could occur as a result of the proposed project and provides general preventive measures that will substantially reduce the risk of incidental take of CRLF.

Before dam removal activities commence, the following measures will be implemented:

- The name and credentials of a biologist qualified to act as construction monitor will be submitted to the U.S. Fish and Wildlife Service (USFWS) for approval at least 15 days before commencement of work.

- A USFWS-approved biologist will survey the worksites two weeks before the onset of removal activities. If CRLF, tadpoles, or eggs are found, the approved biologist will contact the USFWS to determine if moving any of these life-stages is appropriate. If the USFWS approves moving the animals, the approved biologist

will be allowed sufficient time to move frogs from the worksites before work activities begin. If CRLF are not identified, demolition may proceed at these sites.

- All work activities within or adjacent to potential CRLF aquatic habitat will be completed between May 1 and November 1 (with the concurrence of the CDFG, which typically requires in-stream work to be completed by October).

- Exclusionary fencing (i.e., silt fences) will be installed around all project areas that are within 100 feet of or adjacent to potential CRLF habitat.

- A USFWS-approved biologist will conduct a training session for all dam removal personnel. At a minimum, the training will include a description of CRLF and its habitat, the importance of CRLF and its habitat, general measures that are being implemented to conserve CRLF as such measures relate to the project, and the boundaries within which dam removal activities will occur.

- A plan describing pre-project conditions and restoration methods of disturbed areas will be prepared by a qualified biologist, reviewed and approved by the CDFG (see Mitigation Measure D-9a).

During dam removal activities, the following measures will be implemented:

- A USFWS-approved biologist will be present at active worksites until such time that the removal of CRLF, instruction of workers, and habitat disturbance have been completed. After this time, the contractor or permittee will designate a person to monitor onsite compliance with all minimization measures. The USFWS-approved biologist will ensure that this individual receives training as outlined in the PBO.

- During work activities, all trash that may attract predators will be properly contained, removed from the worksite, and disposed of regularly. Following dam removal, all trash and construction debris will be removed from work areas.

- A spill prevention plan for potentially hazardous materials will be prepared and implemented as recommended under the discussion for *O. mykiss*.

- All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 50 feet away from any riparian habitat or water body (see the mitigation measure recommended for *O. mykiss*).

After dam removal activities are completed, the following measures will be implemented:

- The SFPUC will restore areas disturbed during dam removal activities with an appropriate assemblage of native vegetation suitable for the area. Channel banks will be returned to original grade slope, and appropriate bank stabilization techniques will be implemented to reduce the potential for erosion and sedimentation (see Mitigation Measure D-9a).

- Monitoring. The SFPUC will monitor the pond adjacent to the Sunol Dam access road for the first two years after dam removal to determine the effects of lowering groundwater levels on CRLF. Monitoring will include protocol habitat assessment

for CRLF. The monitoring area will include the pond and the project reach of Alameda Creek.

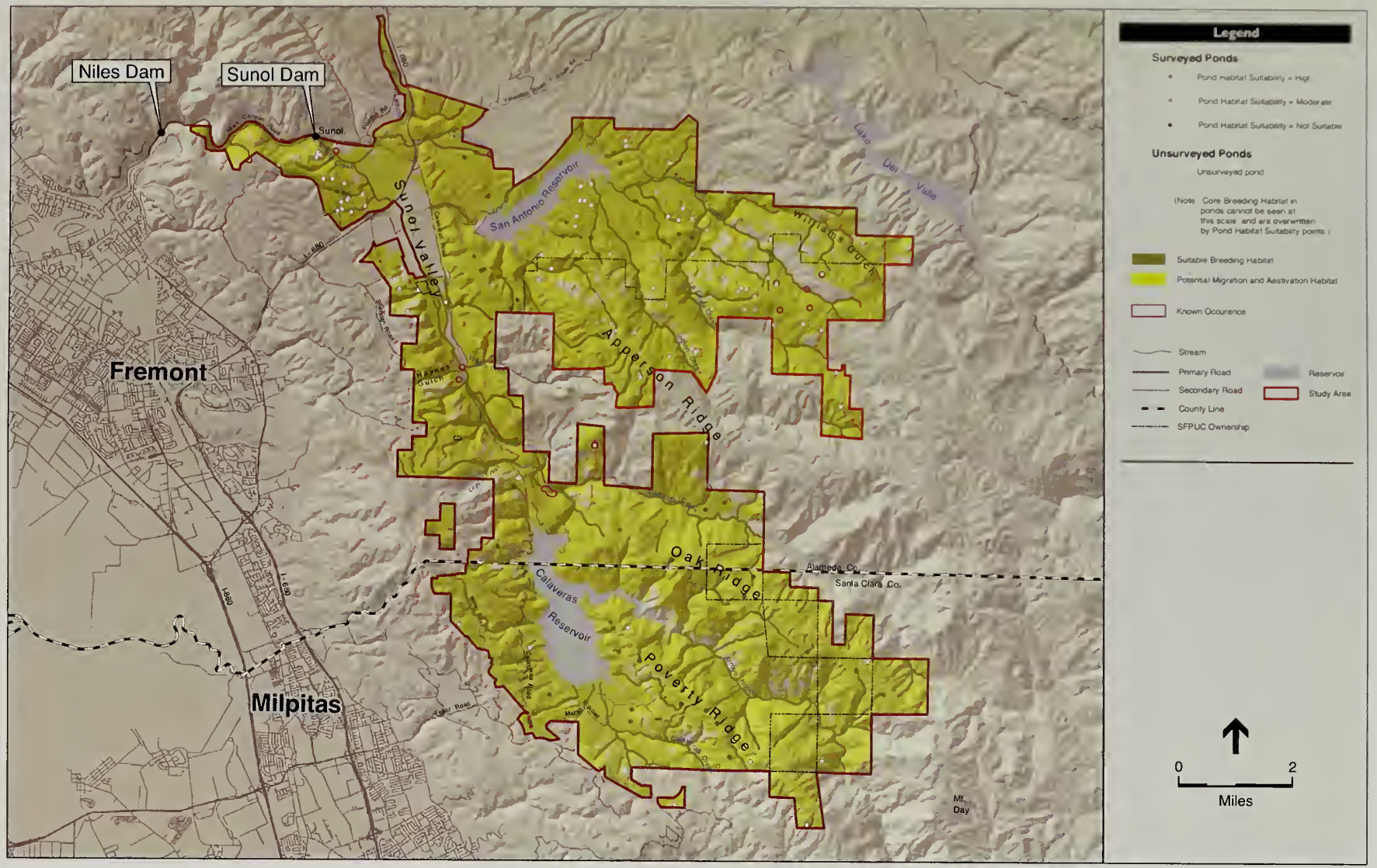
- Monitoring methods will include assessment of aquatic breeding habitat for CRLF and may include but is not limited to:
  a. Pond water depth and duration
  b. Vegetation occurring within the pond and Alameda Creek
  c. Observation of species in the pond and Alameda Creek
  d. Pond and creek water temperature
- Monitoring reports will be submitted to the regulatory agencies for each of the first two years after dam removal. If after the first two years aquatic habitat for CRLF is diminished in the pond, subsequent monitoring or mitigation at a ratio 1.1:1 may be applied.
- Monitoring will also include Alameda Creek within the project reach. If, as anticipated, potential aquatic breeding habitat for CRLF is created as a result of dam removal activities, this habitat creation may provide suitable mitigation if there is a permanent loss of aquatic breeding habitat in the pond.

- Mitigation. If monitoring of the CRLF pond and project reach of Alameda Creek indicates project-related changes (i.e., groundwater lowering), the SFPUC will consult with the USFWS to determine the need for additional mitigation. Such mitigation may include the restoration or enhancement of CRLF habitat on lands currently owned by the SFPUC. The map (see Figure 25) prepared as part of the proposed SFPUC Habitat Conservation Plan illustrates that sufficient CRLF habitat exists within the Alameda Creek watershed if additional mitigation is required. Such mitigation will be provided at a minimum 1.1:1 ratio.

D-4b **Consultation with USFWS.** The SFPUC will consult with the USFWS to establish additional reasonable and prudent measures to avoid CRLF take and mitigation for temporary and permanent impacts to CRLF habitat. These measures will be implemented in addition to those measures implemented under Measure D-4a.

D-5 **Measures to reduce impacts to western pond turtles and their habitat**. Before diversion/dewatering and dam removal activities occur, a qualified biologist will perform pond turtle surveys within 300 feet of the dam removal areas. Surveys will include nests and eggs in addition to adult and subadult individuals. The biologist will be responsible for the survey, for relocating adult turtles if they are found, and for relocating turtles that move into the dam removal zone after dam removal has begun. Dam removal will not proceed until the area is determined to be free of turtles and their nests.

In addition to the preconstruction survey for turtles, Mitigation Measures D-4a and D-4b (to minimize impacts on CRLF), including the presence of an onsite monitoring biologist, will provide effective protection for western pond turtles.



SOURCE: Jones & Stokes, 2004

Sunol-Niles / 201591 ■

Figure 25
Habitat Distribution for
California Red-Legged Frog

D-6 **Measures to protect Alameda whipsnake.** The SFPUC will conduct preconstruction surveys and employee sessions. Biological monitors will be onsite to identify and relocate any Alameda whipsnakes that come into the Niles Dam project area. If feasible, the work area will be isolated from entry by this species using exclusionary fencing or other appropriate means approved by the USFWS.

D-7a **Measures to protect nesting and breeding birds and raptors.** The following mitigation measures will be implemented to address potential impacts to nesting and breeding birds and raptors in the vicinity of the proposed project. To the extent feasible, removal activities will avoid the nesting season (between March 15 and August 15). If dam removal must occur during this period, the project area will be surveyed before dam removal by a qualified biologist to verify the presence or absence of nesting birds or raptors. If the survey indicates the potential presence of nesting birds or raptors, the results will be coordinated with the CDFG, and suitable avoidance measures will be developed and implemented. Dam removal will observe the CDFG avoidance guidelines, which require buffer zones around active raptor nests and nests of other birds, as specified by the CDFG. Buffer zones will remain until young have fledged. If it appears that demolition activities may cause nest abandonment, demolition activities must cease until the young are able to fly well enough to avoid demolition areas.

D-7b **Measures to protect nesting great blue heron.** Before clearing and grubbing activities at Sunol Dam, a qualified biologist will conduct preconstruction surveys to determine if acting nesting is occurring at the observed nest site. If nests are observed, then a buffer will be created around the rookery, and no dam removal activities will occur within the buffer zone until young have fledged. If it appears that demolition activities may cause nest abandonment, demolition activities must cease until the young are able to fly well enough to avoid demolition areas.

A noise level of no greater than 85 decibels will be enforced at the heron rookery, approximately 800 feet upstream of the dam. This parameter may be met through a variety of standard noise-reducing procedures for construction equipment (also see Appendix A, page 19, BMP 14). Contract specifications will include requirements for the use of blasting methods, including qualifications for the blasting contractor, the use of noise control methods and threshold noise levels, transportation and storage of explosives, safety considerations, and other limitations. The specifications will also require the submittal of a blasting plan by the contractor; this plan will cover the proposed noise control techniques, blasting charge size and limits, and hours of blasting.

D-8 **Measure to protect San Francisco dusky-footed woodrat.** A qualified biologist will conduct preconstruction surveys for woodrats before site clearing and grubbing activities. If active stick houses are observed, exclusionary fencing (i.e., silt fencing) will be installed around all project areas that are within 100 feet of active nests. If removal of inactive stick nests is required, a qualified biologist will monitor the removal. If a nest

cannot be avoided, then live traps will be set at nest sites to trap and remove woodrats from the anticipated work area.

D-9a **Restore temporary loss of habitat.** The project includes the restoration of disturbed areas created by demolition-related activities such as the construction of access roads. Grassland/shrub habitat will be restored to pre-project conditions with native vegetation. All riparian woodland areas disturbed or removed during dam removal activities will be restored to pre-project conditions. The final project design will avoid impacts to riparian habitat within the Alameda Creek corridor to the extent feasible. The SPFUC will consult with a qualified biologist/arborist to develop a restoration and monitoring plan that will be approved by the permitting agencies. Once the project reaches the design phase and before the start of construction, a qualified biologist or arborist will count, identify the species, and map the trees within the construction footprint. Upon completion of dam removal activities, the SFPUC will replace trees removed or destroyed at a minimum 1.1:1 or other appropriate ratio, as agreed on by the regulatory agencies. The replacement trees will be native tree species. Restored areas will be monitored for a minimum of five years. The restoration and monitoring plan will include specific performance criteria, monitoring methods, timing of annual reports, and conditions for remedial actions if plan criteria are not met. The SFPUC will be responsible for ensuring that the restoration plan is implemented. See also Mitigation Measure F-1b.

D-9b **Revegetate with native trees and shrubs.** Dam removal activities will result in lowered groundwater levels and could remove backwater areas within the active stream channel. Some riparian vegetation could be temporarily lost as groundwater levels and sediment distribution adjust to the new conditions. However, riparian vegetation is expected to recolonize along the new stream channel. A mitigation and monitoring plan targeting the riparian areas will be developed, and the plan will be approved by the permitting agencies. As conditions stabilize, the recolonization of riparian habitat will be monitored by a qualified biologist/ecologist. If necessary, revegetation (i.e., planting) will be implemented to facilitate the recolonization or re-establishment of riparian vegetation along the creek channel. Riparian habitat areas will be monitored for a minimum of five years. The mitigation and monitoring plan will include specific performance criteria, monitoring methods, timing of annual reports, and conditions for remedial actions if plan criteria are not met. The SFPUC will be responsible for ensuring that the revegetation plan is implemented.

D-10 **Measures to protect bats.** Before clearing and grubbing activities, a qualified biologist will conduct preconstruction surveys for the bats. If active roosts are observed, a buffer will be placed around the roosts, and no dam removal activities will occur within the vicinity of the roosts. If it appears that demolition activities may cause nest abandonment, demolition activities must cease until the young are able to fly well enough to avoid demolition areas.

Geology, Soils, and Seismicity

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Identified in this DEIR

E-1 The SFPUC will adopt standard construction and engineering practices, which will require winterizing the construction sites and protecting exposed soil during heavy rainfall. In addition, the SFPUC will implement BMPs (see Appendix A, p. 19) to minimize disturbance to embankments and all areas surrounding the dams and impoundment. These practices will include adopting a plan of action to minimize heavy equipment traffic around the dams and anywhere along the creek banks. Any stockpiling of sediment or other unconsolidated material will be appropriately protected from runoff into the creek. Draining of excavated sediment will ensure that runoff does not enter the creek until the discharge is below or meets regulatory discharge thresholds for surface water releases to streams. Discharge limits include the latest regulatory threshold concentrations for parameters such as turbidity, specific conductance, and total dissolved solids. Discharge limits would be set forth, as required, in the State Water Resources Control Board's (SWRCB) General Permit for Construction Activities (see the Initial Study BMPs for Hydrology, Groundwater, and Water Quality, below).

E-2 During the final design phase of the dam removal project, SFPUC engineers will determine the extent to which the abutments can be safely removed without triggering slope failure or destabilizing the slopes. For Sunol Dam, the SFPUC will leave enough of both abutments to ensure structural integrity. Special consideration will be given to the bedrock integrity above the left abutment. In the case of Niles Dam, the left abutment might be entirely removed and the right abutment partially left in place to provide sufficient stability to protect the integrity of SR 84. The SFPUC will develop design criteria using standard geotechnical engineering practices to ensure that the stability of the bedrock slopes and abutments is maintained following the dam removal.

Hydrology, Groundwater, and Water Quality

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified BMPs for channel diversion/dewatering and water quality protection. These measures are as follows:

> Diversion structures will be constructed. Water will be discharged in a non-erosive manner (e.g., on gravel or vegetated bars, hay bales, plastic, etc.). Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows). Water diversion structures allow the SFPUC to isolate the work area, thereby avoiding or minimizing

downstream water quality impacts. If earth is used, the downstream and upstream faces may be covered by a protected covering (e.g., plastic or fabric) to minimize erosion.

In conjunction with diversion structures, pumps or gravity-fed pipe systems are used to dewater sites.

If high levels of groundwater in a work area are encountered, the water is pumped out of the worksite. If necessary, the water will be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment before the water re-enters a creek.

When diversion structures are removed, to the extent practicable, the ponded flows will be directed into the low-flow channel within the worksite.

Silt barriers, such as filter rolls, fiber coirs, silt fences/curtains or basins, or other effective devices[6] are installed, as necessary, downstream of the worksites.

Wet sediments may be stockpiled (outside of a live stream) so water can drain or evaporate before removal to minimize water quality impacts. Water is not allowed to drain directly into channels (outside of the work area) or onto city streets without providing water quality control measures.

No fueling, cleaning, or maintenance of vehicles or equipment takes place within channel banks to avoid the release of deleterious substances into surface waters. Inspection for leaks will take place on all equipment using fuel or requiring fluids on a daily basis.

Trucks may be lined with an impervious material (e.g., plastic), or the tailgate blocked with dry dirt or haybales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out. Water is not allowed to drain directly into channels (outside of the work area) or onto city streets without providing water quality control measures.

Streets are cleaned of mud and/or dirt by street sweeping, as necessary, and not by hosing down the street.

In addition, the Initial Study (see Appendix A, p. 32) contained a mitigation measure for sediment quality (see Utilities and Public Services, above).

Mitigation Measures Identified in this DEIR

Degradation of Water Quality During Dam Deconstruction

F-1a The project applicant will prepare a stormwater pollution prevent plan (SWPPP) prior to construction activities, as required by the SWRCB General Permit for Construction Activities. Implementation of the plan starts with the commencement of demolition-related activities and continues though the completion of the project. Upon completion of the project, the sponsor must submit a Notice of Termination to the SWRCB to indicate

[6] Based on a comment from the SFBRWQCB, straw bales have been replaced with filter roles, fiber coirs, or other effective filtration devices.

that demolition is completed. At a minimum, this plan will include the following requirements:

- Dam removal activities are scheduled to occur between May and November, with in-channel work scheduled to occur between June and October. This schedule will reduce the potential for erosion and surface runoff from rainfall events, among other potential impacts that could result from work during higher flow/precipitation months.

- In the unlikely event that demolition does occur during a wet period, runoff from the project area will be regulated through a stormwater management/erosion control plan that should include provision for silt traps/basins, grading of surface flows to silt traps, and covering of loose material or stockpiles to divert runoff. Sediment basin/traps will be located and operated to minimize the amount of offsite sediment transport. Any trapped sediment will be removed from the basin or trap and placed at a suitable location onsite, away from concentrated flows, or removed to an approved disposal site.

- BMPs selected and implemented for the project will be in place and operational prior to the onset of major earthwork on the site. The construction phase facilities will be maintained regularly and cleared of accumulated sediment as necessary.

- Hazardous materials such as fuels and solvents used on the construction sites will be stored in covered containers and protected from rainfall, runoff, accidental spill, and vandalism. A stockpile of spill cleanup materials will be readily available at all construction sites. Employees will be trained in spill prevention and cleanup, and individuals will be designated as responsible for prevention and cleanup activities.

- Refueling and maintenances of vehicles will be conducted outside of the creek floodplain wherever practicable. All refueling or maintenance activities should include secondary containment.

F-1b In addition to SWPPP requirements, the SFPUC will also detail a site restoration plan for the vicinity of the dams, including removal of equipment access ramps and restoration of affected slopes to minimize bank erosion. The SFBRWQCB will be responsible for reviewing and approving the plan. Minimum requirements of this plan include:

- All ramps into the worksites will be removed, and as near to natural a floodplain as possible re-established to prevent excessive bank erosion during high flow events. Grading around the remaining abutments will be performed with flood stages in mind, and all earth fill will be sufficiently armored against scour to protect remaining abutments from excessive erosion and exposure during flood flows.

- Temporary erosion control measures will be provided until restoration landscaping is established and can minimize discharge of sediment into Alameda Creek. Filter rolls, fiber coirs, or other effective devices will be placed adjacent to the water body.

- After the completion of grading, erosion protection will be provided on all disturbed slopes. Restoration will be facilitated by mulching, hydroseeding, or

other methods and will be initiated as soon as possible after completion of grading and prior to the onset of the rainy season (by November 1).

- Permanent restoration/landscaping will emphasize drought-tolerant perennial ground coverings, shrubs, and trees to improve the probability of slope and soil stabilization without adverse impacts to slope stability due to irrigation infiltration and long-term root development.

F-1c In addition to compliance with applicable regulatory agency requirements set forth by the SFBRWQCB regarding disposal of waters discharged from site diversion/dewatering activities, the SFPUC will prepare a dewatering plan that will incorporate applicable discharge regulations and provide contractors with guidance on surface water and groundwater discharge during demolition activities. The dewatering plan will become part of the project.

Historical Resources

Impacts on architectural resources due to demolition of the historical dams cannot be mitigated to a less-than-significant level, even with implementation of Mitigation Measures G-1a and G-1b. However, the mitigation measures identified below would reduce impacts on other historical resources to a less-than-significant level.

Mitigation Measures Identified in this DEIR

G-1a Prior to the demolition of Sunol and Niles Dams, the SFPUC will retain a qualified architectural historian who will document Sunol and Niles Dams in accordance with the Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) standards (National Park Service, 2003). Pursuant to Section 110(b) of the National Historic Preservation Act, final HABS and HAER documentation will be submitted to the Northwest Information Center, Sonoma State University, the California Historical Resources Information System, the History Room in the San Francisco Public Library, and the Major Environmental Analysis section of the San Francisco Planning Department. The recordation of Sunol and Niles Dams to HABS/HAER standards, or other treatment measures, does not mitigate to a less-than-significant level the impact caused by demolition of a historical resource (14 California Code of Regulations Section 15126.4[b]); therefore, a significant unavoidable impact remains.

G-1b Before the removal of Niles Dam, the SFPUC will retain a qualified archaeologist to prepare and submit to the San Francisco Planning Department's Environmental Review Officer (ERO) for review and approval an Archaeological Research Design/Data Recovery Plan (ARD/DRP), prepared in accordance with State Historic Preservation Office guidelines for archaeological research designs (California Department of Parks and Recreation, 1991). The principal objective of the ARD/DRP will be to delineate the assumptions, principles, and rules to be followed during the dam's removal. The ARD/DRP will identify the means necessary to preserve the defining characteristics of

the resource, Vallejo Dam and Aqueduct, in terms of eligibility for listing in the National Register of Historic Places (NRHP)/California Register of Historical Resources (CRHR). Methods to preserve the context during the dam's removal include, but are not limited to:

- Documentary preservation of the scientifically consequential information regarding the location, method of construction, use of materials, purpose and function, and level of workmanship
- Identification of the important questions within the historical context that can be answered during the removal of Niles Dam (e.g., how the original diversion structure fit with the water conveyance system as a whole, and why this site was selected for this particular use)
- Recovery of data sets needed to respond to identified scientific questions, or recovery of those features that convey the significance of the resource under Criteria A and B
- Gathering of information during demolition to allow the reconstruction of how the structure looked in the past

Furthermore, the ARD/DRP will determine the conditions that need to be met to allow the full-scale demolition of the dam to be completed. That is, the ARD/DRP will state that, when the scientifically consequential information has been gathered to the satisfaction of the ERO and the consulting archaeologist, the removal of the dam can proceed unabated.

Upon completion of the objectives outlined in the ARD/DRP, a Niles Dam archaeological resources report will be completed. The archaeological consultant will submit a draft report to the ERO that includes the original ARD/DRP, the results of the implementation of the research design, and copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the NRHP/CRHR. Information that may put at risk any archaeological resource will be provided in a separate removable insert within the draft report.

Copies of the draft report will be sent to the ERO for review and approval. Once approved by the ERO, copies of the report will be sent to the California Archaeological Site Survey, Northwest Information Center (NWIC).

G-2a The SFPUC will retain the services of a qualified archaeological consultant having expertise in California prehistoric and historical archaeology to undertake an archaeological monitoring program. All plans and reports prepared by the consultant as specified herein will be submitted first to the ERO for review and comment. Archaeological monitoring and/or data recovery programs required by this measure could suspend demolition for up to a maximum of four weeks. At the direction of the ERO, the suspension of demolition can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less-than-significant level potential effects on a

significant archaeological resource, as defined in CEQA Guidelines Section 15064.5(a)(c).

The archaeological monitoring program will, at a minimum, include the following provisions:

- The archaeological consultant, SFPUC, and ERO will meet and consult on the scope of the archaeological monitoring program reasonably prior to the commencement of any project-related soil-disturbing activities. The ERO, in consultation with the project archaeologist, will determine what project activities will be monitored. In most cases, any soil-disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, or pile driving (foundation, shoring, etc.), will require archaeological monitoring because of the potential risk these activities pose to archaeological resources and to their depositional context.

- The archaeological consultant will advise project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource.

- The archaeological monitor(s) will be present on the project site according to a schedule agreed upon by the archaeological consultant and the ERO, until the ERO has, in consultation with the archaeological consultant, determined that project construction activities could have no effects on significant archaeological deposits.

- The archaeological monitor will record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis.

- If an intact archaeological deposit is encountered, all soil-disturbing activities in the vicinity of the deposit will cease. The archaeological monitor will be empowered to temporarily redirect demolition crews and heavy equipment until the deposit is evaluated. The archaeological consultant will immediately notify the ERO of the encountered archaeological deposit. The archaeological consultant will, after making a reasonable effort to assess the identity, integrity, and significance of the encountered archaeological deposit, present the findings of this assessment to the ERO.

If the ERO, in consultation with the archaeological consultant, determines that a significant archaeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the SFPUC either:

- The proposed project will be redesigned so as to avoid any adverse effects on the significant archaeological resource; or

- An archaeological data recovery program will be implemented, unless the ERO determines that the archaeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

If an archaeological data recovery program is required by the ERO, the archaeological data recovery program will be conducted in accordance with an archaeological data

recovery plan (ADRP). The project archaeological consultant, SFPUC, and ERO will meet and consult on the scope of the ADRP. The archaeological consultant will prepare a draft ADRP that will be submitted to the ERO for review and approval. The ADRP will identify how the proposed data recovery program will preserve the significant information the archaeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes will address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods will not be applied to portions of the archaeological resources if nondestructive methods are practical.

The ADRP will include the following elements:

- Field Methods and Procedures. Description of proposed field strategies, procedures, and operations.
- Cataloguing and Laboratory Analysis. Description of selected cataloguing system and artifact analysis procedures.
- Discard and Deaccession[7] Policy. Description of and rationale for field and post-field discard and deaccession policies.
- Interpretive Program. Consideration of an onsite/offsite public interpretive program during the course of the archaeological data recovery program.
- Security Measures. Recommended security measures to protect the archaeological resource from vandalism, looting, and non-intentionally damaging activities.
- Final Report. Description of proposed report format and distribution of results.
- Curation. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession[8] policies of the curation facilities.

Human Remains, Associated or Unassociated Funerary Objects.[9] The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity will comply with applicable state and federal laws, including immediate notification of the Alameda County coroner and, in the event of the coroner determines that the remains are Native American remains, notification of the Native American Heritage Commission (NAHC), which will appoint a Most Likely Descendant (MLD) (Public Resources Code Section 5097.98). The archaeological consultant, SFPUC, and MLD will make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated

[7] Deaccession describes the disposal of an artifact.
[8] A unique descriptor for a particular artifact or object for record keeping purposes.
[9] Either associated with the burial or not associated with the burial; that is, buried as religious or ceremonial significance given the individual's status in society.

funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, curation, possession, and final disposition of the human remains and associated or unassociated funerary objects.

Final Archaeological Resources Report. The archaeological consultant will submit a draft final archaeological resources report (FARR) to the ERO that evaluates the historical significance of any discovered archaeological resource and describes the archaeological and historical research methods employed in the archaeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource will be provided in a separate removable insert within the draft FARR.

Copies of the draft FARR, along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the NRHP or CRHR, will be sent to the ERO for review and approval. Once approved by the ERO, copies of the FARR will be sent to the NWIC.

G-2b Prior to the commencement of ground-disturbing activities, dam removal personnel will receive environmental training in a manner that will inform all personnel of the possibility of encountering historical resources.

All construction personnel involved in activities that may uncover prehistoric resources will be trained in the identification of prehistoric resources, which could include flaked stone, projectile points, mortars, pestles, soil containing shell or bone, or human burials. Historical resources could include stone or adobe foundations or walls, structures and remains with square nails, and refuse deposits. The level of training for demolition activities will be sufficient such that the workers will know when to call their supervisors to investigate an object that may be a historical resource. Supervisors will receive sufficient training to determine when a cultural resources specialist should be contacted to identify any found objects. If cultural resources are encountered during demolition, the dam removal crew will halt work in the area and not collect or disturb the materials until the archaeological monitor(s), appointed under Measure G-2a, have evaluated the location and determined an appropriate mode of action.

G-3 The SFPUC will notify the ERO of unanticipated discoveries of paleontological resources. The SFPUC will retain the services of a qualified paleontologist per the Society of Vertebrate Paleontology standards (SVP, 1991), who will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in Section 15064.5 of the CEQA Guidelines. In the event of an unanticipated discovery of a fossil during dam removal activities, excavations within 50 feet of the find will be temporarily halted or diverted until the discovery is examined by a qualified paleontologist. The paleontologist will notify the ERO to determine procedures to be followed before demolition is allowed to resume at the location of the find. If the ERO determines that avoidance is not feasible, the

paleontologist will prepare an excavation/data recovery plan for mitigating the effect of the project on the qualities that make the resource important, and such plan will be implemented. The plan will be submitted to the ERO for review and approval before implementing the excavation/data recovery plan.

Noise and Vibration

Mitigation measures are identified below to reduce impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

The Initial Study (see Appendix A, p. 19) identified a BMP to avoid noise impacts. The measure is as follows:

> In general, work is conducted during normal working hours during weekdays. Internal combustion engines would be equipped with adequate mufflers. Excessive idling of vehicles would be prohibited.

Mitigation Measures Identified in this DEIR

The following measures are recommended to further reduce the less-than-significant noise impacts.

H-1 If controlled blasting occurs, the SFPUC will notify the residents in the town of Sunol in advance of these activities. Notification may include the delivery of flyers to residences describing the warning horn and blasting sounds and providing the dates and times blasting may occur; and the placement of signs in the town of Sunol and on SR 84 advising eastbound and westbound drivers of the controlled blasting activities. At a minimum, signs on SR 84 should be placed as close to the blasting activity as feasible, one-half mile on either side of each dam, and one mile on either side of each dam.

Cumulative Environmental Effects

The DEIR examines related projects that could, in combination with the proposed project, result in considerable cumulative environmental effects. Several projects are planned in the Alameda Creek watershed. Cumulative demolition-related impacts could occur if these other planned projects were to coincide with dam removal activities; and cumulative long-term impacts could occur if these planned projects affected overlapping environmental resources. The individual projects within the Alameda Creek watershed are subject to separate environmental review processes. A variety of mitigation measures have been included in the project description and recommended in this report to ensure that the proposed project would not contribute to any potentially significant cumulative impacts.

At the Niles Dam site, a California Department of Transportation (Caltrans) project could contribute to the cumulative loss of willow habitat and the incidental take of Alameda whipsnake. The SFPUC has initiated consultation and coordination with the USFWS to address potential habitat impacts. However, the proposed project would avoid contributing to the cumulative loss or degradation of suitable habitat for special-status species through mitigation measures identified in this DEIR.

The following measure is recommended to further reduce the cumulative effect on SR 84 traffic flow and safety to a less-than-significant level.

I-1 The SFPUC will provide project schedule information updates in order for Caltrans to arrange its project work schedule to minimize potential cumulative effects on SR 84.

References

California Department of Parks and Recreation, *Guidelines for Archaeological Research Designs,* Preservation Planning Bulletin: No. 5, February, 1991.

Jones & Stokes, *SFPUC Alameda Watershed Habitat Conservation Plan Biological Inventory Report. Draft*, submitted to San Francisco Public Utilities Commission, San Francisco, CA. May 2004.

National Park Service, *Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation*, Federal Register, Vol. 68, No. 139, July 21, 2003. 43159-43162, 2003.

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U.S. Fish and Wildlife Service (USFWS), Programmatic Formal Endangered Species Consultation on Issuance of Permits under Section 404 of the Clean Water Act or Authorizations under the Nationwide Permit Program for Projects that May Affect the California Red-legged Frog, Sacramento Field Office, California, 1999.

CHAPTER VI

Significant Environmental Effects that Cannot Be Avoided if the Proposed Project Is Implemented

In accordance with Section 21067 of the California Environmental Quality Act (CEQA), and with Sections 15126(b) and 15126.2(b) of the CEQA Guidelines, the purpose of this section is to identify environmental impacts that could not be eliminated or reduced to a less-than-significant level by mitigation measures included as part of the project, or by other mitigation measures that could be implemented, as described in Chapter V, Mitigation Measures. Findings in this chapter are subject to final determination by the Planning Commission as part of its certification of the EIR.

The project, even with implementation of Mitigation Measures G-1a and G-1b, would result in significant, unmitigable historical resources impacts on architectural structures (i.e., Sunol and Niles Dams).

CHAPTER VII
Significant Irreversible Environmental Changes

In accordance with Section 21100(b)(2)(B) of the California Environmental Quality Act (CEQA), and with Sections 15126(c) and 15126.2(c) of the CEQA Guidelines, the purpose of this section is to identify significant irreversible environmental changes that would be caused by implementation of the proposed project.

Demolition activities, by their very nature, result in irreversible changes. The removal of Sunol and Niles Dams, which are considered historical resources, would result in irreversible environmental changes. The project would also result in irreversible changes to the immediate habitat upstream by removing the pools behind each dam. In addition, irreversible changes could occur downstream as sediment moves and deposits within the creekbed. Riparian vegetation has established based on the water table created by the impoundments behind the dams. Once the dams are removed, the water table would drop, thus affecting this riparian vegetation; however, riparian vegetation is not expected to disappear from either location. It is expected that a succession of vegetation would occur; plants adapted to drier conditions would colonize (and would be planted by the SFPUC), while riparian vegetation would re-establish closer to the new flow line of Alameda Creek.

In addition, implementing the project would result in an irreversible commitment of energy resources, such as fuel (gasoline and diesel) and oil for demolition equipment and workers' personal vehicles. This commitment would end upon completion of the project.

CHAPTER VIII
Alternatives to the Proposed Project

A. Introduction

The California Environmental Quality Act (CEQA) Guidelines Section 15126.6(a) require environmental impact reports (EIR) to "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibility attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." The CEQA Guidelines set forth the following criteria for selecting alternatives:

- [T]he discussion of alternatives shall focus on alternatives *to* the project *or* its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly. (Section 15126.6[b])

- The range of potential alternatives shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. (Section 15126.6[c])

- The specific alternative of "no project" shall also be evaluated along with its impact. (Section 15126.6[e][1])

- The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision-making. (Section 15126.6[f])

As discussed in Chapter III, Project Description, there are three primary and equal project objectives:

1. Remove barriers to fish passage in keeping with the Alameda Creek Fisheries Restoration Workgroup (ACFRW) goal of restoring a self-sustaining population of steelhead to the Alameda Creek watershed, while recognizing other beneficial uses (e.g., water supply and flood control).

2. Reduce or eliminate an existing public safety hazard and related San Francisco Public Utilities Commission (SFPUC) risk management concerns.

3. Perform dam removal in an environmentally sensitive manner.

B. Alternatives

Before the preparation of this DEIR, the SFPUC prepared a feasibility study for the removal and/or modification of fish passage barriers at Sunol and Niles Dams (SFPUC, 2000). In this study, several approaches to the project design were analyzed at a conceptual level of detail.[1] The SFPUC determined that the proposed project best meets the overall goals and objectives of the project. Consideration was given to the following design approaches:

- Cut the dam without notches. Remove the upper approach portion of the dam to a desired elevation so that fish can easily pass the top of the dam. This approach is essentially the same as the proposed project analyzed in this DEIR.

- Cut the Dam and Cut Notches. For Sunol Dam, lower the entire dam to the construction joint below the bottom of the aqueduct and cut notches. For Niles Dam, lower the entire dam and then cut notches. This design approach is similar to the project described in the SFPUC's conceptual engineering report (CER) with the sediment removal option (Geomatrix Consultants, 2004) discussed below, except that only one notch was proposed in the CER option.

- Cut Notches without Cutting the Dam. This design approach involves cutting notches in the dams, without lowering. This approach does not meet Objective #2 because portions of both dams would still be present and would therefore remain an attraction to trespassers. The SFPUC could cut notches in an environmentally sensitive manner, thus meeting Objective #3. However, because this approach does not meet one of the key project objectives it was eliminated from further consideration.

- Drill Holes through the Dam. This design approach involves drilling or cutting holes (circular or rectangular) into the dam, which would be approximately 50 percent of the length of the dam. This could be done in an environmentally sensitive manner, thereby complying with Objective #3. However, this approach would not meet Objective #2 for the reasons noted for the "cut notches" approaches and was therefore eliminated from further consideration.

- Remove Dam Completely. For Sunol Dam, this design approach was described in the Feasibility Study as "… removal of the entire dam and the aqueduct, to the level of the streambed." This approach, with the exception of removing the aqueduct, is also effectively the same as the proposed project described in this DEIR, assuming "level of streambed" means to the historical streambed elevation and not all of the dam, which extends below bedrock (see Figure 7, cross-section A-A′). For Niles Dam, this approach was described in the Feasibility Study as "removal of the entire dam." The proposed project would also remove all of Niles Dam, if it is determined the right abutment can be removed without destabilizing the retaining wall along SR 84. This approach would meet all of the

[1] Cut elevations, size, shape, and location of notches or holes were examined at a conceptual level. The study acknowledged that actual elevations would take into consideration biology, hydrology, and environmental impacts. For this analysis, all alternatives are considered to meet Objective #1.

objectives of the project. It is simply a variation on the proposed project analyzed in the DEIR.

- Fish Passageways. This design approach proposed fishway structures.[2] This approach is discussed below as the retain Dams, Install Fish Ladders and Safety Fencing alternative. This alternative to the proposed project was evaluated for its ability to achieve key project objectives and to avoid or minimize impacts associated with the proposed project.

- Phased Approach. This option was discussed in a meeting with the National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), Weiss Associates, and the SFPUC on September 30, 2004. The discussion centered on the extent of removal and whether an inappropriate elevation would cause upstream problems. Based on the discussions, however, a slightly lower elevation was determined to be appropriate and was incorporated into the proposed project. Thus, this alternative is essentially the same as the proposed project analyzed in this DEIR. Like the proposed project, this approach would require an adaptive management and monitoring program, but would occur over a much longer period. Because a phased approach to dam removal would involve multiple rounds of demolition activities and repeat disturbance of the creek and riparian corridor, it would likely have greater environmental impacts than the proposed project and was not evaluated further.

- Conceptual Engineering Report Design Approach with Sediment Removal. This project design approach was described in the July 9, 2004 Initial Study/Notice of Preparation (see Appendix A). It is similar to the proposed project, with the following exceptions:

    - Sediment from behind Sunol and Niles Dams would be removed and off-hauled to Vasco Road Sanitary Landfill or to a nearby commercial gravel and sand quarry (e.g., Napa Canyon Quarry, Mission Valley Rock Company, or RMC Pacific Materials).

    - Sunol Dam would contain a low-flow notch.

    - Most of the left abutment (looking downstream) of Niles Dam would remain, as would a greater portion of the right abutment (looking downstream).

  This design approach does not meet the project objectives or substantially lessen the significant effects of the proposed project and therefore was eliminated from further consideration.

Four of these design approaches are similar to the proposed project and do not represent distinct project alternatives (i.e., Cut the Dam without Notches, Cut the Dam and Cut Notches, Remove Dam Completely, and the Phased Approach). Elements of each of these approaches have been integrated into the final project evaluated in this DEIR. No additional alternatives were discussed at the public scoping meeting or in comments on the Initial Study.

This alternatives analysis discusses the following alternatives to the proposed project in detail:

[2] Such as a flume with baffles or a series of stepped pools.

- No Project
- Retain Dams, Install Fish Ladders and Safety Fencing

No Project

Description

CEQA Guidelines Section 15126.6(e)(3)(B) describes the "no project" alternative as the circumstance under which the proposed project does not proceed. Consideration of the No Project alternative is specifically required under Section 15126(f) of the CEQA Guidelines. The purpose of describing and analyzing a No Project alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project (CEQA Guidelines Section 15126.6[e][1]). The existing conditions for the No Project alternative are the same as those described in the Notice of Preparation for the proposed project (see Appendix A).

Analysis of the impacts of the No Project alternative includes activities that would reasonably be expected to occur in the foreseeable future if the proposed project were not approved, based on current plans. These activities include the following:

- The SFPUC would continue to maintain and/or repair fencing at Sunol Dam to reduce unauthorized trespassing.
- The SFPUC would continue to maintain the service road leading to the Sunol Dam site.
- The SFPUC would continue to patrol for trespassers and other abnormal conditions, and report illegally parked vehicles along SR 84 (in proximity to the dams) to the California Highway Patrol.
- The dams would continue to act as fish passage barriers as other downstream barriers to fish passage are removed and/or laddered.

Impacts

Under the No Project alternative, the dams would not be removed as described for the proposed project; therefore, the impacts associated with dam removal, including the significant unmitigable impact on architectural resources, would not occur (see Table 15). Under the No Project alternative, barriers to fish passage would remain, and the pools that currently attract trespassers would continue to present public safety and risk management issues for the City and County of San Francisco.

Conclusion

Although the No Project alternative would avoid the impacts associated with the proposed project (e.g., historical resources, riparian/wetland vegetation, special-status species, hydrology/ groundwater/water quality, transportation/circulation, utilities/public services, and

geology/topography), this alternative would not meet the basic project objectives (e.g., removing barriers to fish passage, and reducing or eliminating public safety risk management concerns).

Retain Dams, Install Fish Ladders and Safety Fencing

Description

A fish ladder is a structure designed to allow fish to migrate upstream and continue their function as part of the river ecosystem. Fish ladders generally consist of a flume with baffles or a series of stepped pools that slow water to a velocity more easily negotiated by fish.

Because every river represents a unique situation and challenge, many factors must be considered in designing fish ladders. Because no one fish ladder design accommodates most species of fish, the fish ladder for this project would need to be designed for *O. mykiss*, focusing on the physical characteristics of this species. Flows, energy dissipation, resting areas, drop between pools, attraction velocities, entrance eddies, and the amount of space in the pools are just some of the factors that would need to be considered when designing the fish ladders. It is likely that a pool and weir-style fish ladder would be built, using a series of small dams and pools of regular length to create a long, sloping channel that allows fish to travel around the obstruction. Effectively, the channel would act as a fixed lock to gradually step down the water level; to head upstream, fish would jump over from box to box in the ladder.

To address public safety concerns at both dams, safety fencing would be installed along the access road to Sunol Dam and on the downslope of the SR 84 retaining wall at Niles Dam to exclude the public from accessing the area. The length of fence along Sunol Dam would be 1,500 linear feet. Fencing length along the downslope of SR 84 would be 3,000 linear feet.

Impacts

Impacts related to implementation of this alternative would mostly involve construction of the new fish ladders and installation of the safety fencing at both dam locations. Construction of fish ladders would involve installing cofferdams and stream diversion structures, dewatering the creek, and using construction equipment to build the cement fish ladder. Except for the use of specific equipment (i.e., cement trucks) to build the fish ladder, these construction activities would be similar to those for the proposed project and would have similar effects. Other impacts resulting from installation of concrete fish ladders in Alameda Creek include the potential for a concrete spill into Alameda Creek and the leaching of chemicals from the concrete into the creek. The CDFG would require the newly poured concrete to be excluded from the wetted channel for a period of 30 days before reintroducing flows into the creek. During this period, the concrete is to be kept moist, and any runoff from the concrete would not be allowed to enter Alameda Creek. Commercial sealants (e.g., Deep Seal, Elasto-Deck BT Reservoir Grade) may be applied to the concrete surface if water flow cannot be excluded. If a sealant is used, water would be excluded from the site until the sealant has dried.

Moreover, *O. mykiss* could also be affected while using the fish ladders during migration. Fish ladders sometimes cause delays in migration because debris is easily caught in the ladder, resulting in partial or complete blockage to fish passage. Additionally, there could be actual physical harm to the fish as they try to jump from box to box in the ladder system. The fish ladders would require regular, perpetual maintenance to ensure they function as intended.

Installation of the safety fencing would result in temporary and permanent removal of riparian vegetation at both dam sites. Permanent removal of riparian vegetation would be limited to the area on either side of the fence so that the maintenance crews could maintain the fence. In addition, the fence would block wildlife movement.

This alternative would reduce some of the significant impacts identified for the proposed project, either through avoidance or minimization of the impacts or through implementation of some of the mitigation measures considered for the proposed project. For example, impacts on historical resources would be avoided because the dams would remain in situ. Furthermore, installing fish ladders would not affect the integrity of either dam because the dams had fish ladders at one time. This alternative would minimize truck traffic, as there would be no dam debris to haul away. A smaller area of construction would be required, thus minimizing potential impacts to special-status species and water quality. Although there would be permanent impacts to riparian habitat because of the fence, this alternative would not modify groundwater levels, which would have a potentially greater effect on riparian and wetland vegetation. However, because of the uncertainty that the fish ladders would perform as required, this alternative could result in greater impacts to fish compared to the proposed project.

Conclusion

Only Objective #3 would likely be met with implementation of this alternative, with incorporation of similar mitigation measures as the proposed project. This alternative, however, would result in the permanent loss of riparian vegetation on either side of the fence at both dams. In addition, the fences could impede wildlife movement. Also, some resource agency representatives question the effectiveness of fish ladders.[3]

Compared to the environmental impacts associated with removing the dams under the proposed project, installing fish ladders would result in fewer environmental impacts overall. This alternative would avoid or lesson the impacts associated with the proposed project (e.g., historical resources, riparian/wetland vegetation, special-status species, hydrology/groundwater/water quality, transportation/circulation, utilities/public services, and geology/topography).

With respect to Objective #2, as long as the dams remain in place, public safety is at risk and the City and County of San Francisco would be subject to risk management concerns. Safety fencing does not eliminate these public safety concerns, as the fences could be cut and access to the dam

[3] On October 13, 2004, the NMFS stated that, overall, demolition is preferred, but that fish ladders could be considered a feasible alternative to the proposed project. Fish ladders present the following challenges for fish passage: (1) when the water level is too high, sometimes fish cannot find the ladder; (2) the pool behind Sunol Dam may contain predators; and (3) the pool behind Sunol Dam is likely to have warmer temperatures (Sokolove, 2004). The CDFG recommends that fish ladders "be installed only when absolutely necessary" (CDFG, 1998).

sites gained. In addition, fencing poses a barrier for wildlife movement. Objective #1 might not be fully met because fish ladders could present challenges for fish passage, and fish passage would not be assured, as noted above.

Environmentally Superior Alternative

The CEQA Guidelines requires the identification of an environmentally superior alternative (Section 15126.6[e]). If the "no project" alternative is the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other alternatives (Section 15126.6[e]).

To determine the environmentally superior alternative, this section compares the alternatives with the proposed project and states whether they avoid or substantially reduce any potentially significant impacts associated with the proposed project. The No Project alternative is the environmentally superior alternative because it would avoid the potentially significant impacts identified for the proposed project. However, since the CEQA Guidelines requires the identification of another environmentally superior alternative if the No Project alternative is determined to be the environmentally superior alternative, the Retain Dams, Install Fish Ladders and Safety Fencing alternative would be the environmentally superior alternative because it avoids or substantially reduces the significant impacts of the proposed project.

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California Department of Fish and Game (CDFG), *California Salmonid Stream Habitat Restoration Manual*, 3rd Edition, 1998.

City and County of San Francisco, Planning Department, *Initial Study/Notice of Preparation* (see Appendix A), 2004.

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San Francisco Public Utilities Commission (SFPUC), *Feasibility Study for the Removal and/or Modification of Fish Passage Barriers at the Sunol and Niles Dams*, 2000.

Weiss Associates, *Final Report for Channel Geomorphology Study Niles and Sunol Dam Removal Project, Alameda County, California* (see Appendix B), 2004.

CHAPTER IX
EIR Authors and Consultants

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APPENDIX A

Notice of Preparation, Initial Study, and Distribution List

NOTICE THAT AN ENVIRONMENTAL IMPACT REPORT IS DETERMINED TO BE REQUIRED

Date of this Notice: July 9, 2004

Lead Agency: City and County of San Francisco, Planning Department
1660 Mission Street, 5th Floor, San Francisco, CA 94103

Agency Contact Person: Diana Sokolove **Telephone:** (415) 558-5971

Project Title: 2001.1149E Sunol/Niles Dam Removal

Project Sponsor: San Francisco Public Utilities Commission (SFPUC)

Contact Person: Barbara Palacios (415) 554-0718

Project Address: Sunol Dam is located in the Niles Canyon reach of Alameda Creek at river mile 16.2. Highway 84 (Niles Canyon Road) parallels the creek through Niles Canyon, and lies to the north of the dam. Niles Dam is located on Alameda Creek at river mile 12.8, near the downstream end of Niles Canyon. Highway 84 (Niles Canyon Road) lies directly adjacent to the dam site.

Assessor's Block and Lot: Not Applicable

City and County: Unincorporated Alameda County

Project Description: The project consists of the partial removal of the Sunol Dam and Niles Dam to allow fish passage and to address liability and public safety issues. In association with the removal of the dams, impounded sediment would either be left in place, or would be off-hauled except for a portion of the sediments to fill in the plunge pools downstream of both dams. The project would require the following approvals: (1) California Department of Fish and Game Streambed Alteration Agreement, (2) San Francisco Bay Regional Water Quality Control Board water quality certification or waiver under Section 401 of the federal Clean Water Act or a Waste Discharge Requirement under the state Porter-Cologne Act, (3) U. S. Army Corps of Engineers Nationwide Permit, and (4) Caltrans Encroachment Permit.

THIS PROJECT MAY HAVE A SIGNIFICANT EFFECT ON THE ENVIRONMENT AND AN ENVIRONMENTAL IMPACT REPORT IS REQUIRED. This determination is based upon the criteria of the Guidelines of the State Secretary for Resources, Sections 15063 (Initial Study), 15064 (Determining Significant Effects), and 15065 (Mandatory Findings of Significance), and the following reasons, as documented in the Initial Study for the project, which is attached.

PAUL MALTZER, Environmental Review Officer

Cc: Barbara Palacios, Project Sponsor
Anna Roche, Project Sponsor
O. Chavez / Bulletin Board
L. Fernandez / Master Decision File
Distribution List

Sunol/Niles Dam Removal
Initial Study
2001.1149E

I. PROJECT DESCRIPTION

A. BACKGROUND

Niles Dam is located on Alameda Creek at river mile 12.8, near the downstream end of Niles Canyon (see **Figure 1**). Highway 84 lies directly adjacent to the dam site. Niles Dam reportedly was constructed in 1887 by Spring Valley Water Company (the predecessor to the San Francisco Public Utilities Commission) atop a stone dam originally built in 1841 by Jose de Jesus Vallejo, the brother of General Vallejo, who constructed the original Niles Dam to provide water for a flour mill. The original stone dam probably was founded on bedrock; however, there are no data available to confirm this. The current dam is composed of the original rock-fill base that was capped with concrete.

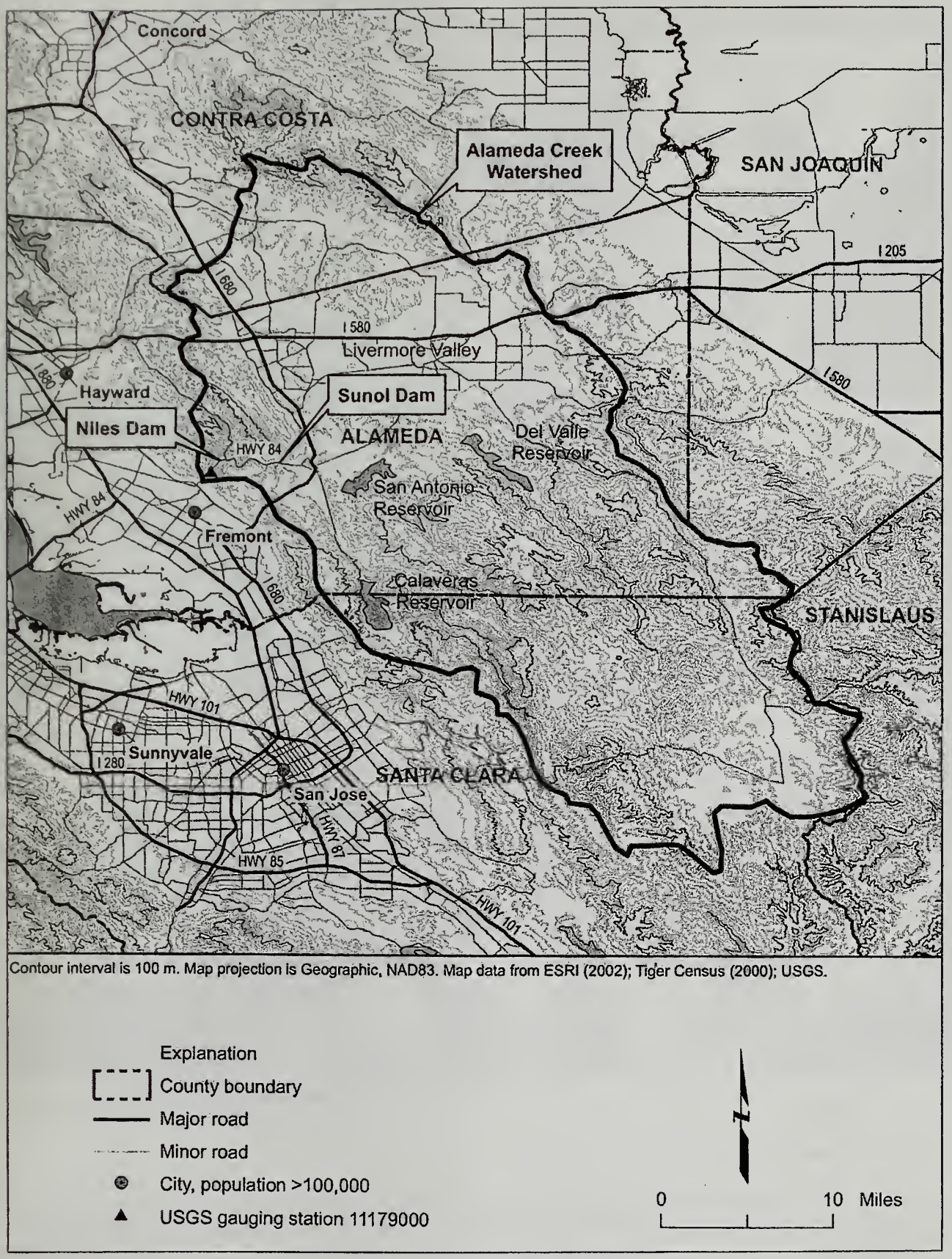
In 1900, the Spring Valley Water Company built Sunol Dam, a gravity concrete dam, to provide water to San Francisco. Sunol Dam was constructed in part to "hold back" groundwater in the upstream gravel deposits that occupy Sunol Valley. The Sunol filter galleries were built upstream around the same time as Sunol Dam to drain the water from the gravels and into the Sunol Aqueduct. Sunol Dam is located in the Niles Canyon reach of Alameda Creek at river mile 16.2 (see **Figure 1**). Highway 84 (Niles Canyon Road) parallels the creek through Niles Canyon, and lies to the north of the dam.

Portions of the Alameda Creek Watershed, comprising nearly 700 square miles, once supported viable runs of anadromous fish. According to research conducted by the Alameda Creek Fisheries Restoration Workgroup (ACFRW), which the San Francisco Public Utilities Commission (SFPUC) participates in, steelhead (*Oncohrynchus mykiss*) are currently prevented from reaching the middle and upper reaches of Alameda Creek because of the presence of downstream migration barriers. Moving upstream from the Bay, there are four barriers to upstream migration of adult steelhead, where Alameda Creek is a trapezoidal earthen flood control channel (see **Figure 2**). The four barriers, owners and approximate locations are:

1. Lower inflatable dam; Alameda County Water District; quarry ponds;
2. 'BART' weir; Alameda County Flood Control District; quarry ponds/BART crossing;
3. Middle inflatable dam; Alameda County Water District; quarry ponds; and
4. Upper inflatable dam; Alameda County Water District; quarry ponds.

Niles Dam may not be a barrier because its height is low enough for adult steelhead to jump; however, Sunol Dam is a barrier because of its height.

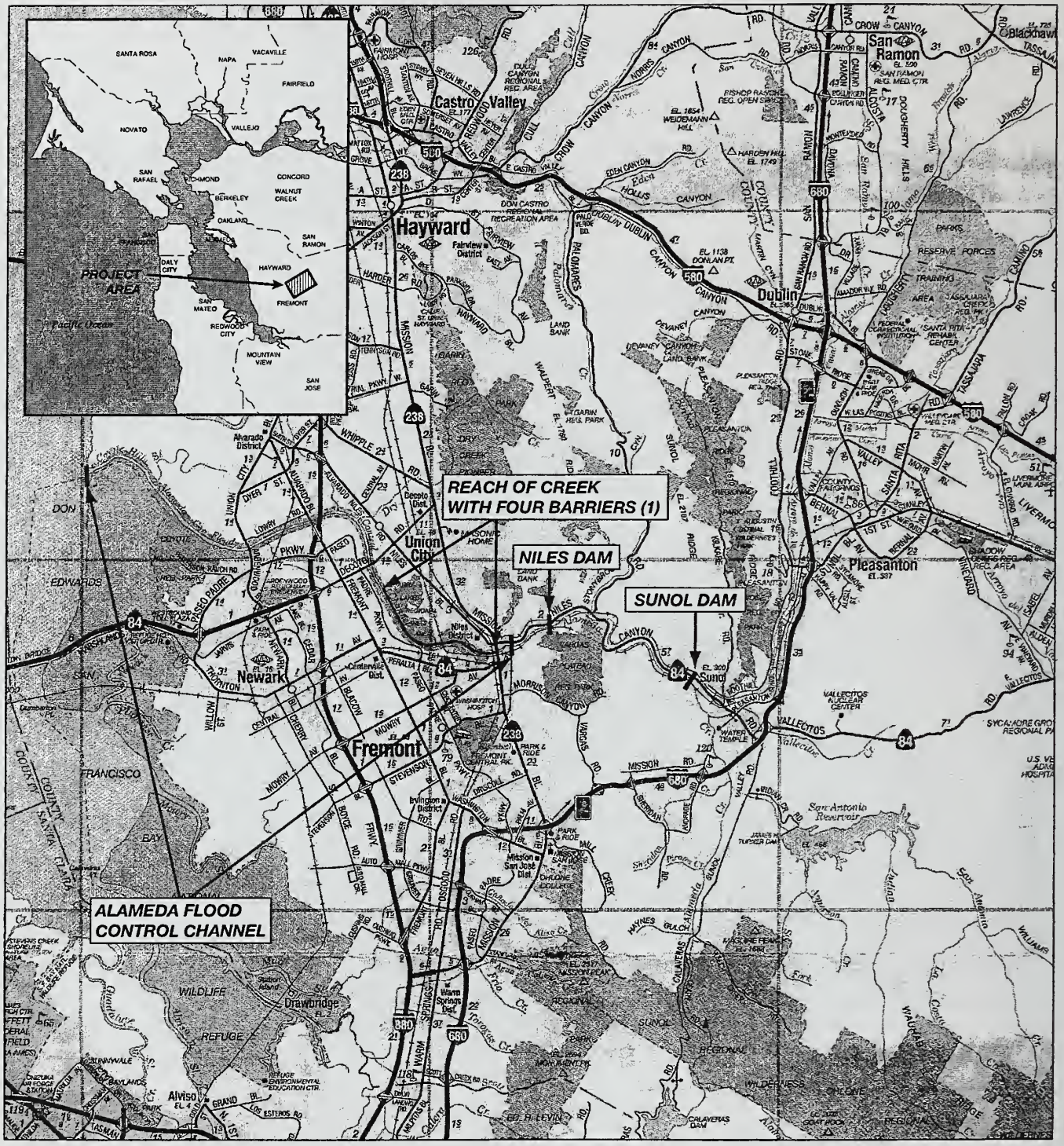
The SFPUC wants to eliminate upstream adult steelhead passage concerns at the two dams before the downstream barriers to upstream migration are bypassed. In addition, the two dams (particularly Sunol Dam) create pools that attract some members of the public despite 'No Trespassing' signage and efforts to exclude trespassers (e.g., locked



SOURCE: Geomatrix

Sunol-Niles / 201591 ■

Figure 1
Map of Alameda Creek Watershed and Location of Sunol and Niles Dams



(1) BART Weir and three inflatable dams operated by the Alameda County Water District.

SOURCE: Environmental Science Associates; CSAA base map

Sunol-Niles / 201591 ■

Figure 2
Location of Anadromous Fish In-Migration Barriers

gates and fences). The SFPUC is considering removing Sunol and Niles dams because of these two issues. The dams are no longer in use by the SFPUC for water diversion or supply.

B. PROJECT OBJECTIVES

There are three primary and equal project objectives:

1. Remove barriers to fish passage in keeping with the ACFRW goal of restoring a self-sustaining population of steelhead to the Alameda Creek watershed, while recognizing other beneficial uses (e.g., water supply and flood control).

2. Reduce or eliminate an existing public safety hazard and related SFPUC liability concerns.

3. Perform dam removal in an environmentally sensitive manner.

C. DESCRIPTION OF SUNOL DAM

According to the U.S. Geological Survey (USGS) Niles 7.5 minute topographic quadrangle, Sunol Dam lies at an elevation of about 220 feet. The Union Pacific Railroad (UPRR, formerly owned by the Western Pacific Railroad) and the Niles Canyon Railroad (NCRR, formerly owned by the Southern Pacific Railroad), which generally run parallel to Alameda Creek in Niles Canyon, lie about 100 and 300 feet to the north, respectively, on either side of Highway 84. A commercial (garden) nursery occupies the low-lying, flat area along the north side of the dam and its upstream reservoir.

An available construction drawing of the dam indicates it has a main crest length of 135 feet, a crest width of eight feet, a base width of 14 feet, and a foundation to crest height of about 28 feet (see **Figure 3**). Top-of-dam elevation is shown as 208.35 feet (no datum given) and as 201.25 feet (Crystal Springs [CS] base). The drawing indicates that the channel bottom of Alameda Creek, directly along the upstream face of the dam, was at elevation 200 feet (no datum given or ground line shown) after construction, which is a little more than eight feet below the crest of the dam. It also shows the dam is founded on bedrock. The drawing shows the Sunol Aqueduct entering a forebay on the right abutment and flowing along the dam in a concrete conduit, just beneath and parallel to its crest. The aqueduct is connected upstream to the Sunol Water Temple. A fish ladder was originally constructed near the north abutment; however, currently only vestiges of it remain. The current height from the dam crest to the downstream channel bottom in the plunge pool is estimated to be up to about 15 feet (Trihey & Associates, 2000). The USGS 7.5 minute Niles, California quadrangle shows a gauging station at Sunol Dam; however, this station appears to be non-operational.

Because of the dam's association with the upstream Sunol inflitration galleries, it meets the Secretary of Interior's criteria A[1], B[2], and C[3] for listing in the National Register of Historic Places (JRP, 2000). The aqueduct is also considered eligible for the National Register of Historic Places.

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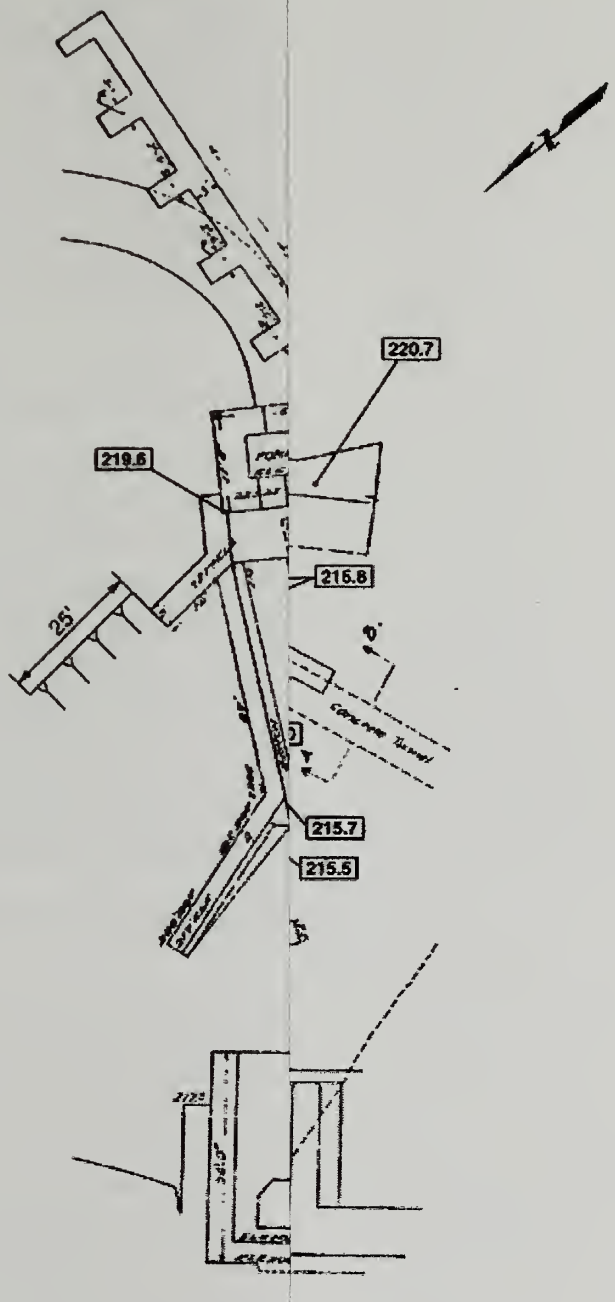
1 In 1976 the American Society of Civil Engineers (ASCE) designated the dam and infiltration galleries as Historic Civil Engineering Landmarks. Criterion A: association with "events that have made a significant contribution to the broad patterns of our history."

2 Sunol dam and the filter galleries were built by Herman Schussler, Chief Engineer for the Spring Valley Water Company. Criterion B: association with "the lives of persons significant in our past."

3 The construction of the filter galleries of which the dam is a component, was the first of its kind to use subsurface water for municipal supply. Criterion C: resources "that embody the distinctive characteristics of a type, period, or method of



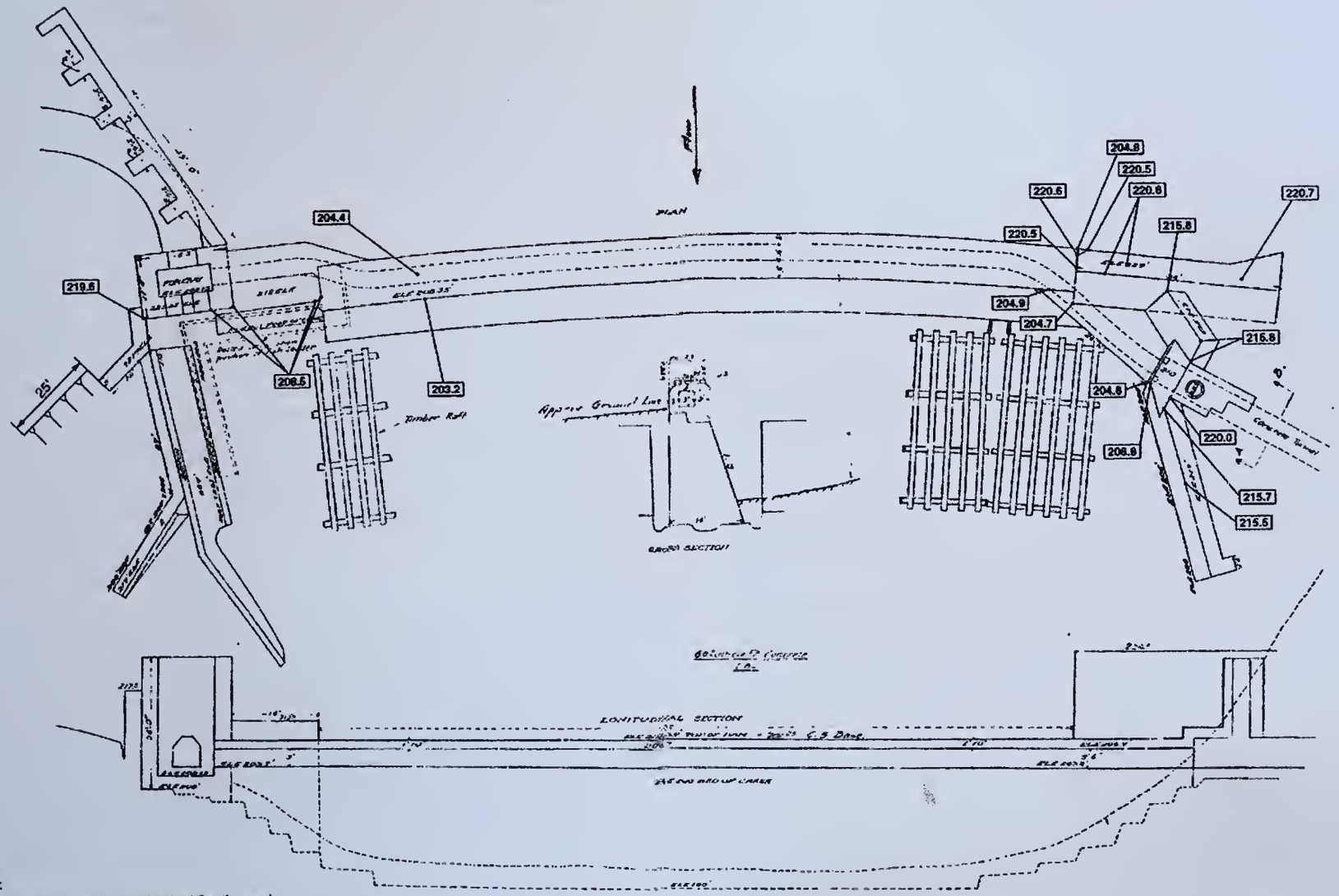
Notes:

1. From drawing No. E29 - Longitudinal
   Plan of Sunol Dam, dated May 25, 19
2. Drawing not to original scale.
3. North arrow is approximate.
4. Surveyed elevations referenced to NG
   (mean sea level).

SOURCE: Geomatrix

Sunol-Niles / 201591 ■

Figure 3
As-Built Drawing of Sunol Dam



Notes:

1. From drawing No. E29 - Longitudinal Section and Plan of Sunol Dam, dated May 25, 1910.
2. Drawing not to original scale.
3. North arrow is approximate.
4. Surveyed elevations referenced to NGVD 29 (mean sea level).

Explanation

204.9 Surveyed elevation in feet

SOURCE: Geomatrix

Sunol-Niles / 201591 ■

Figure 3

As-Built Drawing of Sunol Dam

As part of the conceptual engineering report (Geomatrix, 2004) a topographic map of the dam site was prepared from aerial photography by a professional land surveyor. As part of this task, a number of points on the dam were surveyed in the field to verify the as-built condition. The surveyed elevations are based on the National Geodetic Vertical Datum (NGVD) of 1929, also referred to as mean sea level, which is used as the vertical datum on most USGS maps. In general, the surveyed elevations are between three to five feet lower than the elevations shown on **Figure 3**. With the exception of a 25-foot-long concrete wall on the downstream side of the right abutment and chain-link fencing around the tops of both abutments, the historical drawing appears to accurately reflect the visible components of the dam. **Figure 4** is a composite aerial photograph showing the Sunol Dam site plan, area of ground-disturbing activities and areas to save and protect.

LABORATORY TESTING OF IMPOUNDED SEDIMENTS

Selected samples from each of the seven vibracores[4] collected at Sunol Dam were submitted for laboratory testing, for both environmental (chemical analytical) and geotechnical (grain size distribution) purposes. PCBs, PNAs, pesticides, and TPH motor oil were not detected in any of the samples. TPH diesel was detected in two samples at low levels (1.2 milligrams per kilogram [mg/kg] and 1.1 mg/kg). However, the laboratory indicated that the hydrocarbon pattern did not match its diesel standard. Therefore, TPH diesel is likely not present in these two samples. Metals were detected at low concentrations - well below regulatory criteria for disposal. The detected concentrations were also below accepted background concentrations (except for one detection of nickel just above background). Based on the laboratory results, and on communications with the Alameda County Flood Control and Water Conservation District (ACFCWCD) and Zone 7 regarding dredging of Alameda Creek and Arroyo de la Laguna, the sediments impounded behind Sunol Dam likely are free of potentially hazardous substances, or have concentrations well below regulatory limits for disposal.

IMPOUNDED SEDIMENT VOLUME ESTIMATES

At Sunol Dam, historical cross section data consist of surveyed profiles that extend upstream of the dam for a distance of about 2,000 feet, and downstream of the dam for about 1,000 feet. These data indicate that the original channel bottom of Alameda Creek at the dam was at an elevation of 200 feet. The crest of the dam, as indicated on the drawing, is at elevation 201.25 feet (CS datum). The cross section data indicate that the channel of Alameda Creek was roughly trapezoidal in shape, having a relatively broad, flat bottom with steeply sloping sides. The channel sections directly upstream and downstream of the dam show the channel bottom was gently sloping down to the northeast (right - looking downstream) side of the creek. This part of the channel (i.e., the thalweg) was about one to two feet deeper than the average elevation of the channel bottom, indicating a maximum height between the natural channel bottom and the crest of the dam in this area of about six feet; however, this may reflect some post-dam sediment accumulation. The conceptual engineering report (Geomatrix, 2004) assumes the pre-dam creek bed to be between five to eight and one-half feet below the top-of-dam.

To estimate the volume of sediment impounded behind Sunol Dam, the historical channel cross section data at the dam and extending upstream approximately 2,000 feet were digitized. The sections were used to develop a 3D model of the channel bottom and sides using SiteWorks™ software. The top surface of the impounded sediment was modeled from the spot elevations on the site topographic/bathymetric map prepared for the conceptual engineering report, which were adjusted to the CS datum (the surveyed elevations are about +3 feet CS datum).

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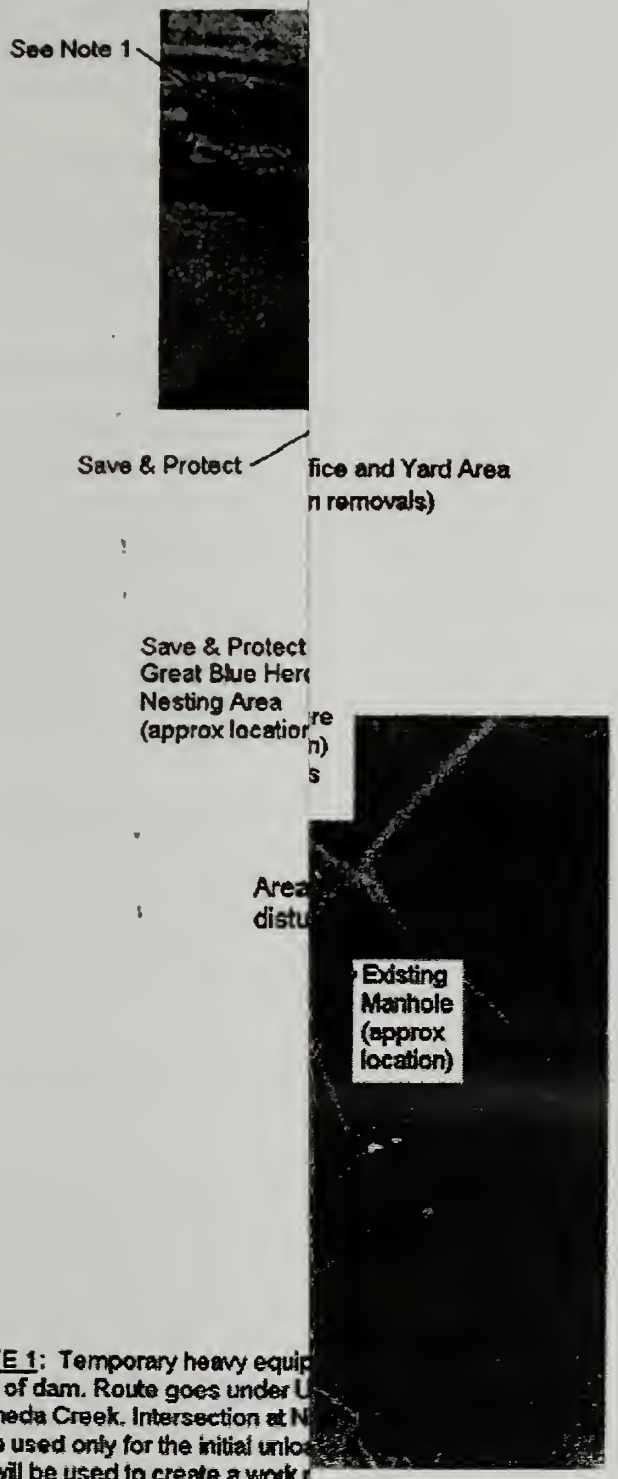
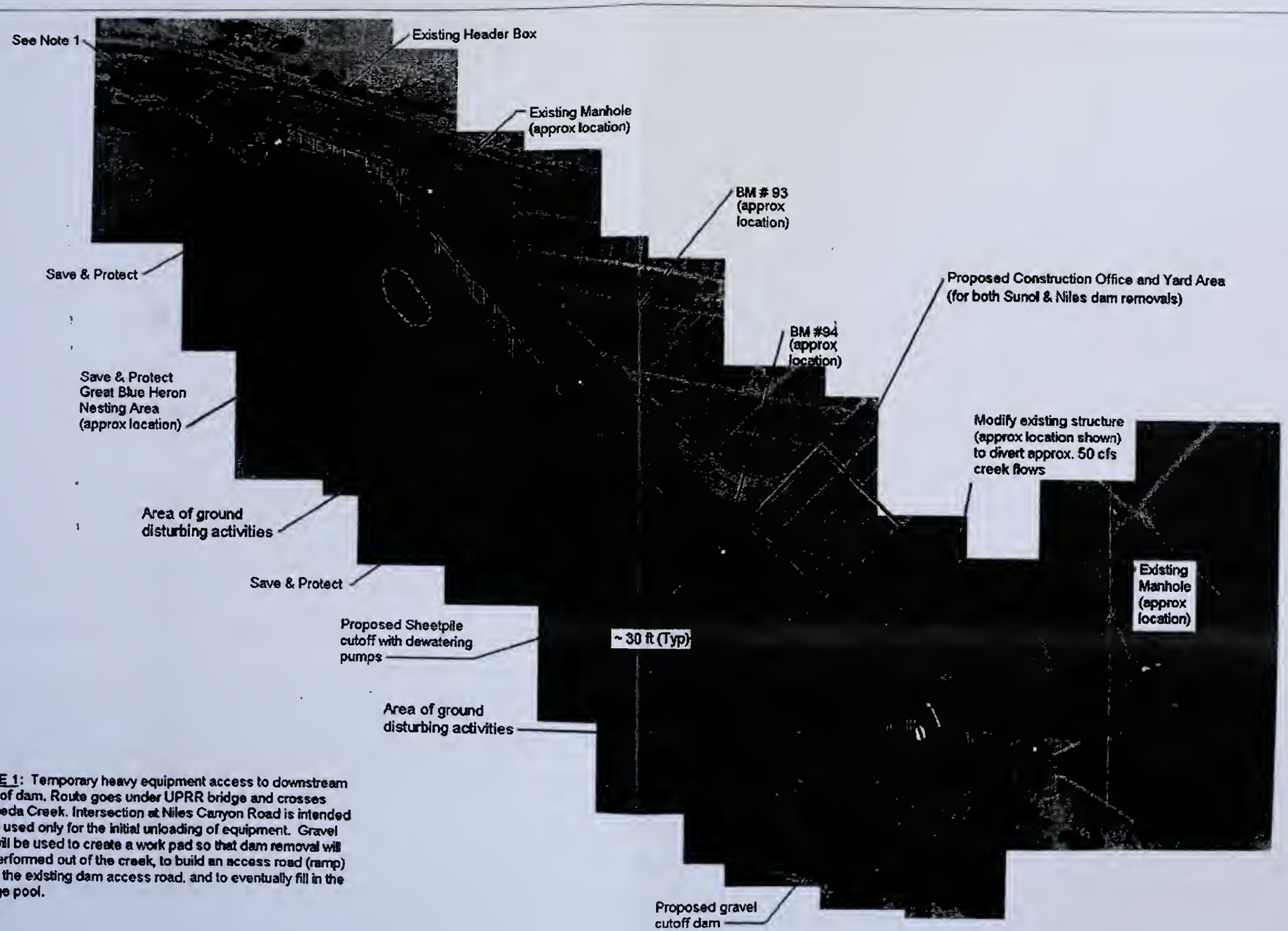
[4] Vibracore sampling is a type of sediment sampling method where the sampling pipe is 'vibrated' downward instead of using the conventional method of drilling.



SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

Figure 4
Sunol Dam - Site Plan


See Note 1
Existing Header Box
Existing Manhole (approx location)
BM # 93 (approx location)
Save & Protect
Proposed Construction Office and Yard Area (for both Sunol & Niles dam removals)
BM #94 (approx location)
Save & Protect Great Blue Heron Nesting Area (approx location)
Modify existing structure (approx location shown) to divert approx. 50 cfs creek flows
Area of ground disturbing activities
Save & Protect
Existing Manhole (approx location)
Proposed Sheetpile cutoff with dewatering pumps
~ 30 ft (Typ)
Area of ground disturbing activities
Proposed gravel cutoff dam

NOTE 1: Temporary heavy equipment access to downstream face of dam. Route goes under UPRR bridge and crosses Alameda Creek. Intersection at Niles Canyon Road is intended to be used only for the initial unloading of equipment. Gravel bar will be used to create a work pad so that dam removal will be performed out of the creek, to build an access road (ramp) up to the existing dam access road, and to eventually fill in the plunge pool.

SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

Figure 4
Sunol Dam - Site Plan

The upstream extent of the sediment is defined by the intersection of the top of the sediment and the original channel bottom. The resulting "wedge" of sediment was estimated to be about 9,000 cubic yards (cy), with the impounded sediments extending approximately 1,500 feet upstream of the dam.

The conceptual engineering report estimated the sediment volume assuming the elevation of the dam crest represents the top of the impounded sediment. This approach represents a more conservative (i.e., higher) estimate of the sediment volume. Under this scenario, the sediment volume is estimated to be about 15,000 cy, with the impoundment extending about 1,800 feet upstream.

SEDIMENT MANAGEMENT STRATEGIES

As discussed above, the conceptual engineering report estimated the volume of sediments impounded behind the dam to be about 9,000 to 15,000 cy. An earlier study by Trihey & Associates (2000) recommended removing the sediment impounded behind Sunol Dam before removing the dam. The study noted that any sediment left in place after dam removal could potentially be deposited in the flood control channel downstream of Niles Dam, and that significant deposition could increase the risk of flooding along the lower reaches of the creek. Hydraulic modeling by Trihey & Associates (2000) also indicates that during an average or above average rainfall year, the sediments upstream of Sunol Dam could be transported downstream. For these reasons, Geomatrix along with HDR Engineering, Inc., who prepared the conceptual engineering report, recommend removing all of the sediments impounded behind Sunol Dam in conjunction with the partial removal of the dam.

Based on an interagency meeting with regulatory agencies (2003), two possible options for sediment management will be evaluated in the EIR: 1) leave sediments in place, allow natural processes to erode sediments downstream, or 2) remove and haul most of the sediments to a landfill (e.g., Vasco Road Sanitary Landfill) that accepts earth materials or to a nearby commercial gravel and sand quarry (e.g., Napa Canyon Quarry, Mission Valley Rock Company, and RMC Pacific Materials) that agrees to accept the material. Under either option, native gravels either upstream or downstream of the dam would be used to fill the plunge pool using an excavator and bulldozer.

PROPOSED CREEK DIVERSION AND DEWATERING SYSTEMS

Two options were evaluated in the conceptual engineering report to address creek diversion with flows expected to be approximately 50 to 60 cubic feet per second (cfs). The first option consists of installing a small cutoff dam at the upstream end of the proposed work site and then installing a steel pipeline with flexible mechanical couplings down to below the dam. This pipeline would have to be moved several times as the dam and sediment removal (if this option is selected) work progresses. The second option is to use the existing aqueduct to divert the creek flows. Since only a small section of the aqueduct is within the actual work site, using it would ensure the diverted flows are not interrupted by the dam removal activities. The aqueduct option is described below.

Downstream Modifications

The header box, which forms part of the left abutment (looking downstream) of the dam, would be modified to connect a temporary diversion pipe and to plug the opening that leads across the crest of the dam. Diversion pipe would be installed to carry the creek flows downstream of the planned work site. A portion of this pipeline would be buried with native gravels and used to create a berm to a) create a downstream cutoff, b) provide equipment access to the left side (looking downstream) of the dam, and c) create a downstream settling basin.

Upstream Modifications

There are four structures that can be modified to serve as an intake into the aqueduct for the diverted creek flows. Modifications would consist of installing a diversion pipe with a slide gate or provision to control and/or shut-off flows into the aqueduct. In lieu of installing a gravity system, pumps could be used. These four structures will be discussed in the EIR.

A temporary cutoff dam to prevent flows from continuing down the creek channel would be installed. It would be located in close proximity to one of the four existing structures that would be modified to serve as the intake to the aqueduct. This dam could be constructed from the native gravels and cobbles or by installing continuous, interlocking, sheetpiles. It would need to be built high enough to ensure that the creek flows will naturally flow into the modified aqueduct structure (if pumps are not used). For each of the four possible creek intake structures, the cutoff dam requirements are different and will be discussed in the EIR.

Since the dam site is associated with the Sunol infiltration galleries, the gradient of the groundwater level is expected to remain relatively flat; thus, groundwater would still enter the work site. A system to reduce and control the amount of groundwater entering the work site would be installed at the upper end of the work site. Once the creek flows have been diverted, a row of continuous, interlocking, sheetpiles may be installed in the now dry creek bed. Immediately downstream, groundwater monitoring wells may also be installed. These wells would be large enough to allow a submersible pump to be lowered in the event that further reduction of groundwater in-flows is needed or to obtain raw water for other uses. Pumped water could either be discharged into a plastic-lined settling basin immediately downstream of these wells for other uses, such as for dust-control along the access road or irrigation of the existing vegetation in the vicinity of the pumps. Alternatively, if it is not turbid, it could be discharged via an above-ground, small diameter, pipeline into the aqueduct.

EXTENT OF DAM REMOVAL

The original dam was built in conjunction with the Sunol infiltration galleries and, based on the construction drawings, it is likely that the original dam is founded on rock that is significantly deeper than the original creek channel. To achieve the project objectives, the following work would need to be performed:

- Remove approximately the top eight feet of the crest of the dam and notch a localized zone down an additional three feet to ensure that a permanent low-flow channel or thalweg is preserved. It is intended that the removal extend down a couple of feet below what was the natural streambed channel before the original construction of the dam. Using this approach, the sediments would cover the remaining section of the dam so that only portions of both abutments and retaining walls would remain visible.

- The historical drawings used to establish the estimated volume of sediments to be removed (see above) indicate that the pre-dam thalweg was approximately eight feet below the present crest of the dam. To ensure that the project objectives would be achieved over the long-term, removing an additional three feet across the crest, combined with removing an additional three feet for the low-flow channel, or thalweg, would be conservative. However, removing this additional amount of concrete may reduce the groundwater level in the upstream gravel bed by a comparable amount.

- Remove the left (looking downstream) wing-wall down to the dam's crest and remove portions of the left abutment that do not provide any buttressing to the existing hillside and in a manner that would eliminate any elevated terraces or platforms that may attract people to climb or use.

- Remove portions of the header box and wing-walls on the right (looking downstream) abutment. Where the aqueduct conduit would now be visible, install either steel grating or a flap gate to prevent unauthorized access into the aqueduct while allowing it to drain.

- The plunge pool that has been created immediately downstream of the dam during periods of high creek flow would be filled with sediment. Material either upstream or downstream of the dam would be used.

- Concrete debris from the dam would be taken to the Ferma Corporation, which is a concrete recycling facility near the town of Sunol, or it would be trucked to Vasco Road Sanitary Landfill for disposal.

Figure 5 shows the final plan and cross-section for Sunol Dam.

STAGING AREA

An approximately 400-foot long by 300-foot wide, temporary, construction staging yard and office would be established on land currently being leased to a nursery (see **Figure 4**).

D. DESCRIPTION OF NILES DAM

According to the USGS Niles 7.5 minute topographic quadrangle, Niles Dam lies at an approximate elevation of 120 feet above sea level. The NCRR lies about 150 feet southeast of Niles Dam, on the slopes directly above the creek. The UPRR lies about 2,000 feet south of Niles Dam.

An available construction drawing of the dam indicates it has a crest length of about 120 feet, a width of about eight feet, and a maximum foundation to crest height of about eight feet (see **Figure 6**). This drawing indicates the main crest was constructed in 1908. The drawing indicates the bottom of the Alameda Creek channel was about six and one-half feet below the north crest of the dam. The north crest is about one foot higher than the main crest, whereas the south crest is about one and one-half feet higher. A fish ladder, which is apparently non-functional, exists near the middle of the dam. The drawing also shows a conduit extending from the upstream side of the right abutment (looking downstream) to a gate house tower on the downstream north bank of the creek, but these structures no longer exist (they may have been removed for construction related to Highway 84). Based on field observations for the conceptual engineering report, the height from the dam crest to channel bottom on the downstream side is probably only about six to eight feet.

Because the dam's original construction is associated with activities related to Mission San Jose, it meets the Secretary of Interior's criteria A[5] and B[6], for listing in the National Register of Historic Places (JRP, 2000).

As part of the conceptual engineering report, a topographic map of the dam site was prepared from aerial photography by a professional land surveyor. As part of this task, a number of points on the dam were surveyed in the field to verify the as-built condition. The surveyed elevations are based on NGVD 1929, also referred to as mean sea level, which is used as the vertical datum on most USGS maps. **Figure 7** is a composite aerial photograph showing the Niles Dam site plan, area of ground-disturbing activities and areas to save and protect.

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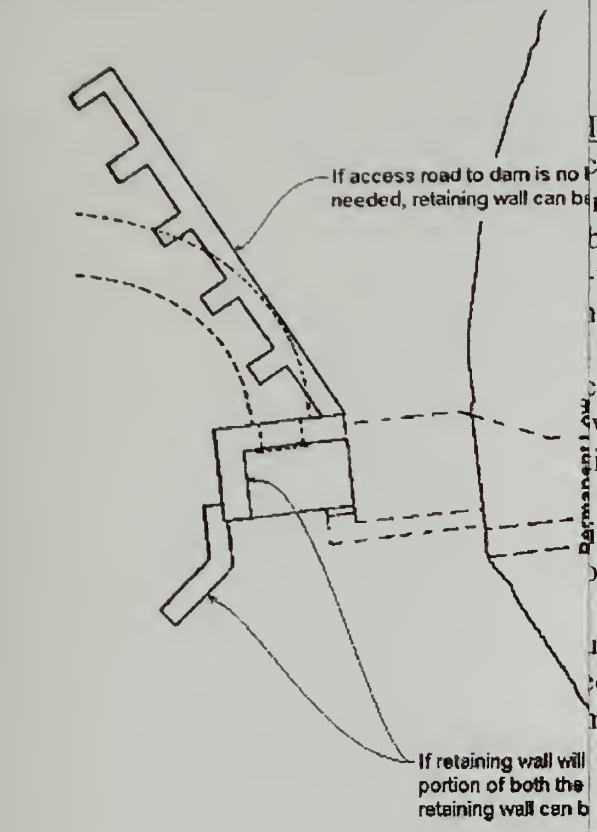
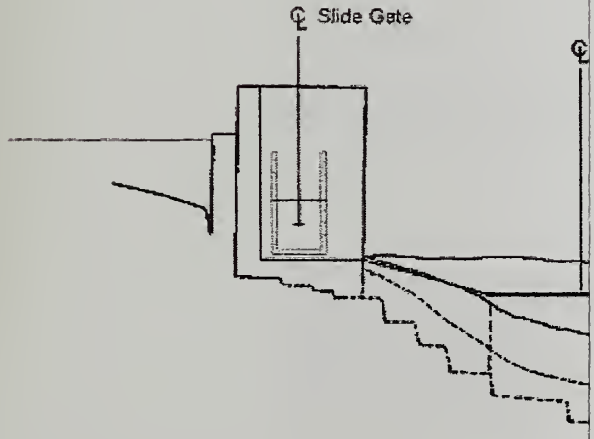
[5] The original dam provided power for a flour mill that was used during both the Mexican and American eras. Criterion A: association with "events that have made a significant contribution to the broad patterns of our history."

[6] The original dam is associated with the life of Jose de Jesus Vallejo who was a significant person during that era. Criterion B: association with "the lives of persons significant in our past."


If access road to dam is no
needed, retaining wall can b
Permanent Low
If retaining wall will
portion of both the
retaining wall can b

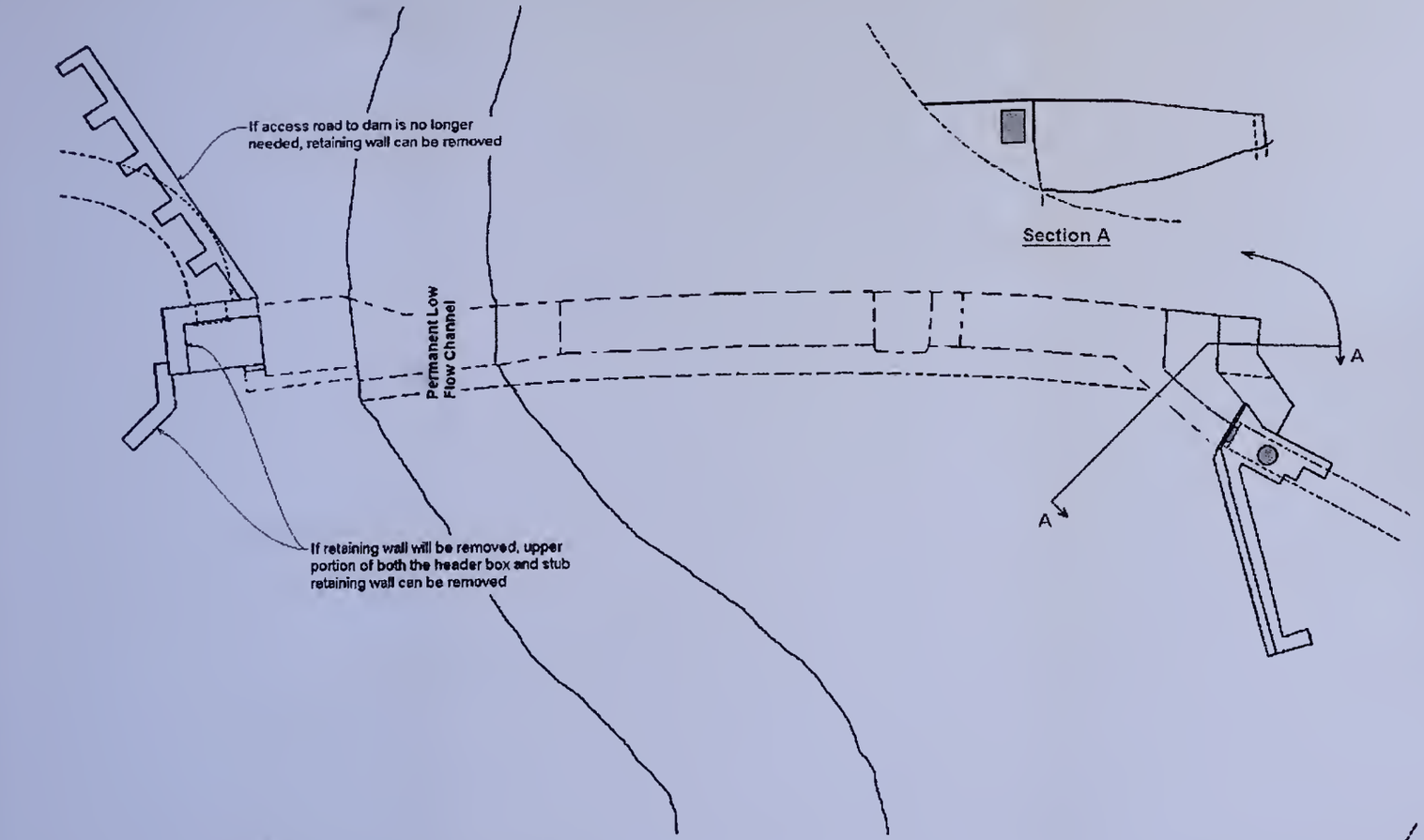
TE: The objective of the final grading is create a condition which allows the ral dynamics of Alameda Creek to blish the location(s) of the primary or flow channel(s) in response to storm ts and/or other flow inducing events upstream releases or diversions). The ceptual grading of the creek channel wn) is predicated on achieving a ively uniform velocity profile through reach to ensure that the remaining on of the dam does not become sed. Grading along the channel length within the proposed limits of ground rbing activities (not shown) also should ct the other, more-natural, reaches of neda Creek.



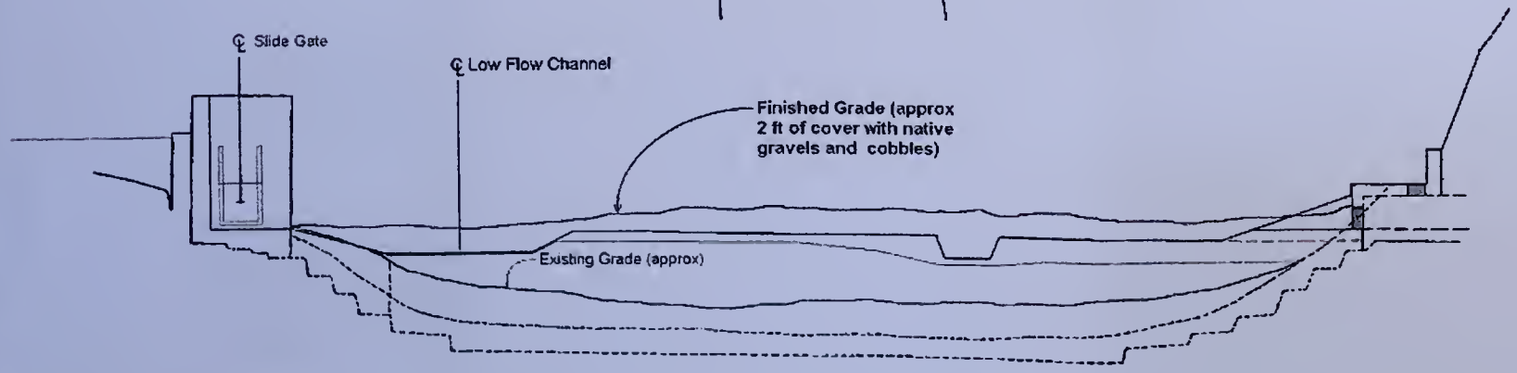
SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

Figure 5
Sunol Dam -
Final Grading and Site Restoration


If access road to dam is no longer needed, retaining wall can be removed
Permanent Low Flow Channel
If retaining wall will be removed, upper portion of both the header box and stub retaining wall can be removed
Section A
A
A

PLAN



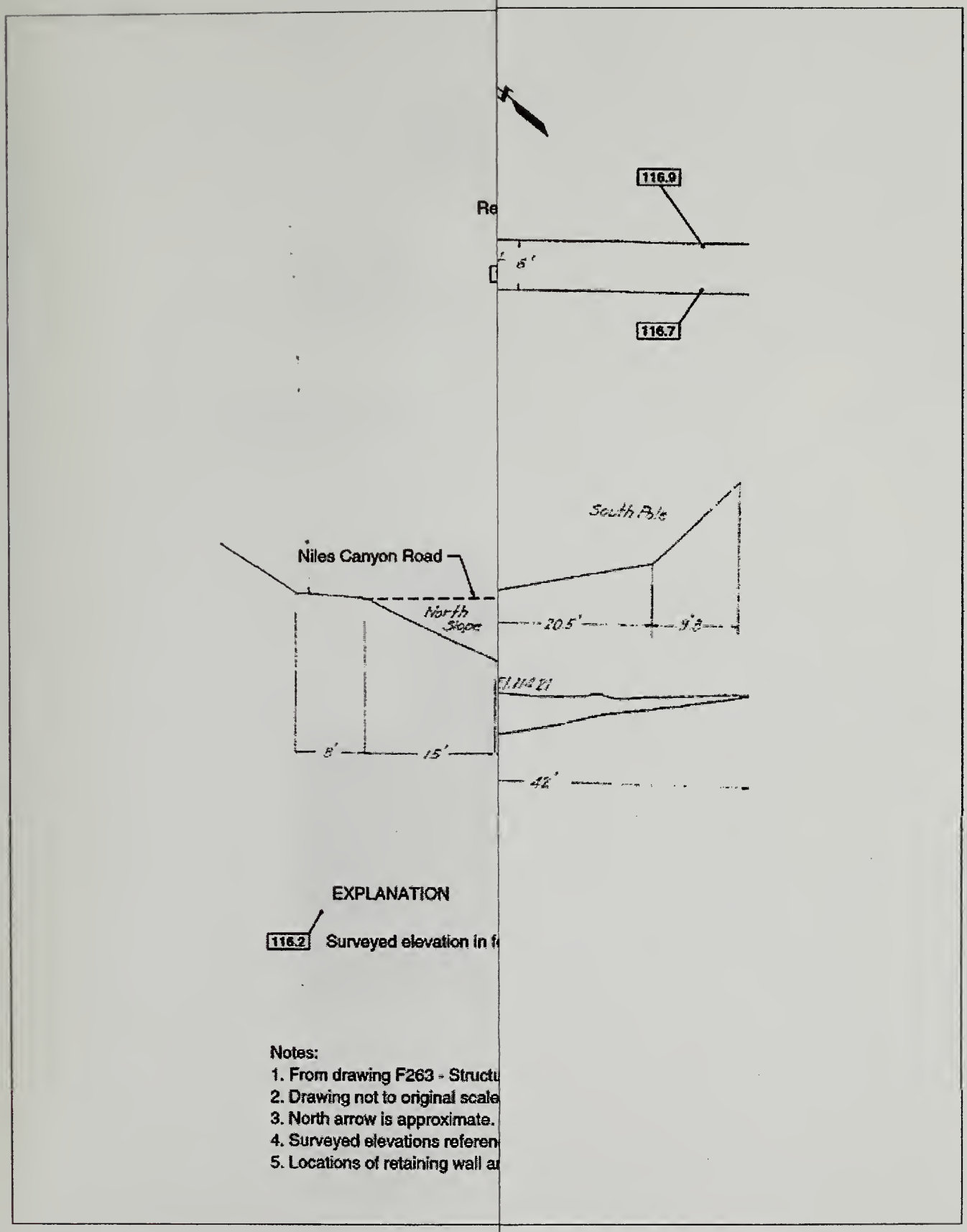
SECTION

NOTE: The objective of the final grading is to create a condition which allows the natural dynamics of Alameda Creek to establish the location(s) of the primary or low-flow channel(s) in response to storm events and/or other flow inducing events (e.g. upstream releases or diversions). The conceptual grading of the creek channel (shown) is predicated on achieving a relatively uniform velocity profile through this reach to ensure that the remaining portion of the dam does not become exposed. Grading along the channel length and within the proposed limits of ground disturbing activities (not shown) also should reflect the other, more-natural, reaches of Alameda Creek.

SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

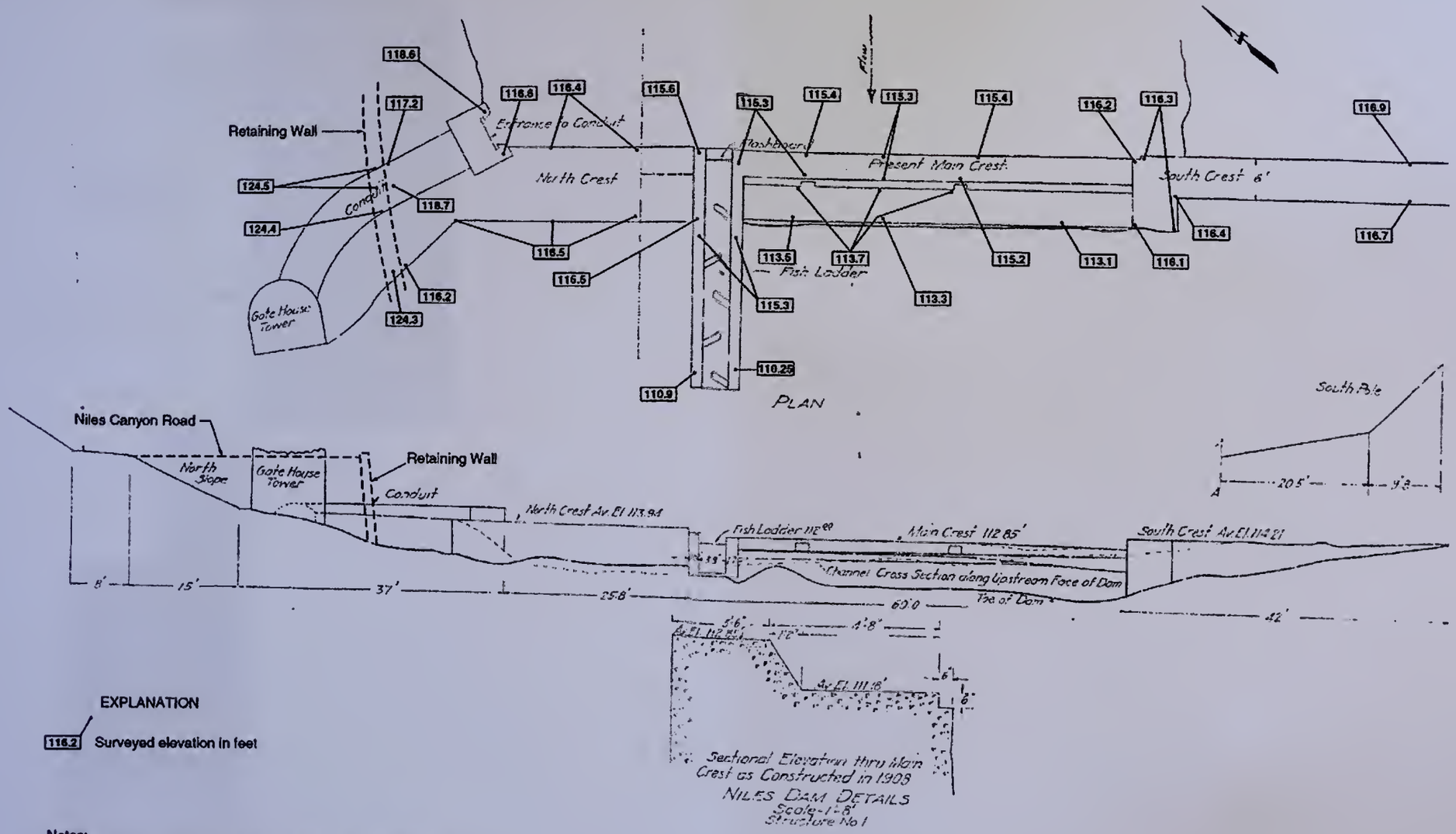
Figure 5
Sunol Dam -
Final Grading and Site Restoration



SOURCE: Geomatrix

Sunol-Niles / 201591 ■

Figure 6
As-Built Drawing of Niles Dam



Notes:
1. From drawing F263 - Structures on Niles Aqueduct, dated April 1914.
2. Drawing not to original scale.
3. North arrow is approximate.
4. Surveyed elevations referenced to NGVD 29 (mean sea level).
5. Locations of retaining wall and Niles Canyon Road are approximate.

SOURCE Geomatrix

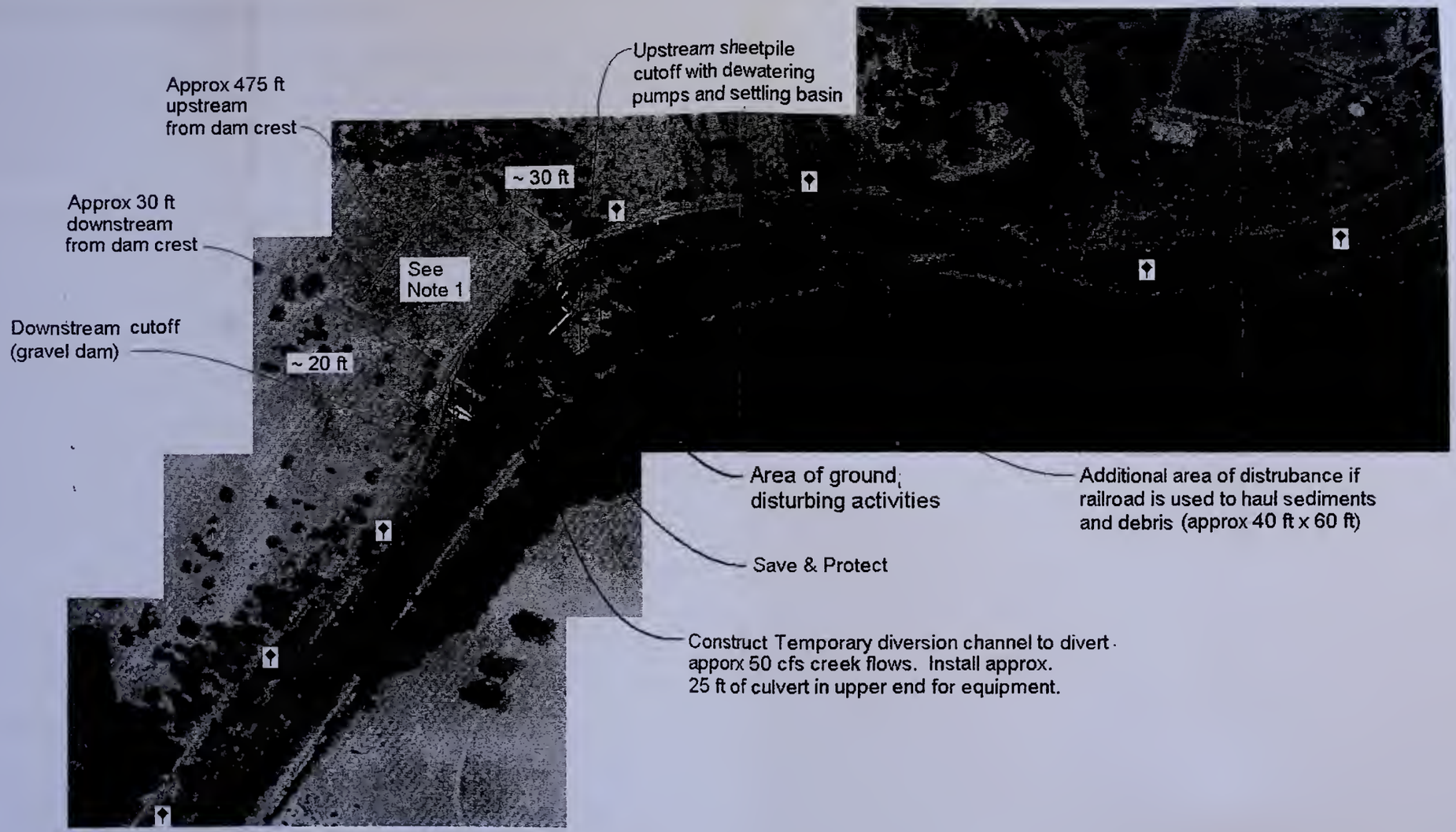
Sunol-Niles / 201591 ■

Figure 6
As-Built Drawing of Niles Dam

SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

Figure 7
Niles Dam - Site Plan


Upstream sheetpile cutoff with dewatering pumps and settling basin
Approx 475 ft upstream from dam crest
~ 30 ft
Approx 30 ft downstream from dam crest
See Note 1
Downstream cutoff (gravel dam)
~ 20 ft
Area of ground disturbing activities
Additional area of distrubance if railroad is used to haul sediments and debris (approx 40 ft x 60 ft)
Save & Protect
Construct Temporary diversion channel to divert apporx 50 cfs creek flows. Install approx. 25 ft of culvert in upper end for equipment.

Note 1: Due to significant access limitations, sediment and dam debris removal needs to be performed during non-peak times (either mid-day or evening) with 1-lane traffic control. To reduce traffic delays, sedmient and debris needs to be stockpiled adjacent to roadway beforehand, use small 10-cyd dump trucks, and limit number of truck loads per shift . In addition, due to road conditions, extra signs and warning/flashing lights ( ) should be used to provide additional warning. Signs should be spaced no more than 500 ft apart.

SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

Figure 7
Niles Dam - Site Plan

LABORATORY SAMPLING OF IMPOUNDED SEDIMENTS

At Niles Dam, field observations along with the grain size data indicate that the sediments behind the dam are coarser than those at Sunol Dam. Given this information, and the poor recovery obtained in the vibracores at Sunol Dam, sampling at Niles Dam was not attempted. Based on the results of the laboratory testing performed on sediments collected behind Sunol Dam, and on communications with the ACFCWCD and Zone 7 regarding dredging of Alameda Creek and Arroyo de la Laguna, the sediments impounded behind Niles Dam likely are free of potentially hazardous substances, or have concentrations well below regulatory limits for disposal.

IMPOUNDED SEDIMENT VOLUME ESTIMATES

At Niles Dam, the available construction drawing includes a channel cross section along the upstream face of the dam and indicates the channel bottom was at most about five feet below the main crest of the dam. The section indicates the channel was generally trapezoidal in shape, with a gently sloping south side, a steeply sloping north side, and a relatively narrow (approximately 26 foot wide), flat bottom.

The volume of sediment impounded behind Niles Dam was estimated using the available cross section along with the site topographic/bathymetric map prepared for the conceptual engineering report. Spot elevations in Alameda Creek extending upstream from the dam were used to model the top of the sediment. The point where the top of the sediment intersects the estimated original channel bottom defines the upstream extent of the impounded sediment. Since there are no historical cross section data upstream of Niles Dam, the conceptual engineering report estimated the gradient of the original channel bottom to be 0.008 feet/feet using the USGS 10-meter-grid Digital Elevation Model. The width of the channel was estimated from the site topographic map. The volume of sediments was estimated to be about 700 cy, with the impoundment extending about 500 feet upstream of the dam.

Geomatrix/HDR also estimated the sediment volume assuming: 1) the elevation of the main crest of the dam represents the top of the impounded sediment, and 2) the width of the channel (approximately 100 feet) on the historic drawing was constant upstream of the dam. This approach represents a more conservative (i.e., higher) estimate of the sediment volume. Under this scenario, the sediment volume is estimated to be about 2,800 cy, with the impoundment extending about 500 feet upstream.

SEDIMENT MANAGEMENT STRATEGIES

The Trihey study (2000) recommended leaving all of the sediment impounded behind Niles Dam because of the relatively small volume of material. It was noted, however, that any sediment left in place could potentially be deposited in the flood control channel downstream of Niles Dam, and that significant deposition could increase the risk of flooding along the lower reaches of the creek. Hydraulic modeling by Trihey & Associates indicates that during an average or above average rainfall year, the sediments upstream of Niles Dam could be transported downstream. For these reasons, the conceptual engineering report recommends removing all of the sediments impounded behind the dam prior to removing the dam. As discussed above, the conceptual engineering report estimated that between about 700 to 2,800 cy of sediment volume are impounded behind Niles Dam. The same options for sediment management at Sunol Dam are also under consideration for Niles Dam – leave sediments in place or remove and haul sediments to a landfill or quarry. Under either option, native gravels either upstream or downstream of the dam would be used to fill the plunge pool using an excavator and bulldozer. The EIR will evaluate the environmental effects of both options as part of the proposed project. Additional samples would be collected from the excavated/stockpiled materials and tested before off-hauling any of the materials, if this option is selected.

PROPOSED CREEK DIVERSION AND DEWATERING SYSTEMS

To dewater the work site, a narrow diversion channel or trench would be built along the left bank (looking downstream). This temporary channel or trench would be aligned to coincide with what appears to be an abandoned, or flood, channel (approximately 30 feet in from the left bank of the creek looking downstream). Lining the channel with plastic sheeting would reduce seepage into the work site and improve the flow carrying capacity of the diversion channel. The plastic sheeting would be anchored with native cobbles and boulders. Since this channel would only be used for a short duration, the excavated materials would be stockpiled immediately adjacent to the channel, preferably on the left side (looking downstream). The alignment of the channel would be allowed to meander to minimize the amount of tree removal and/or trimming. A short segment of culvert would be installed near the upper end to allow equipment access across the diversion channel.

Immediately downstream of where the diversion channel would connect to Alameda Creek, a temporary cutoff dam would be necessary to prevent flow to the work area and allow creek flows to enter the diversion channel. Immediately downstream, dewatering pumps would be installed to reduce and control the amount of water entering the work site. These pumps would discharge into a plastic-lined, settling basin that is built-up from the existing gravels in the channel. The top elevation of this basin would be established slightly higher than the diversion channel to allow the filtered water to flow by gravity into the diversion channel. Placing straw bales at the end of the basin closest to the diversion channel would serve to act as a filter trapping the fines in the larger part of the settling basin and preventing them from entering the diversion channel.

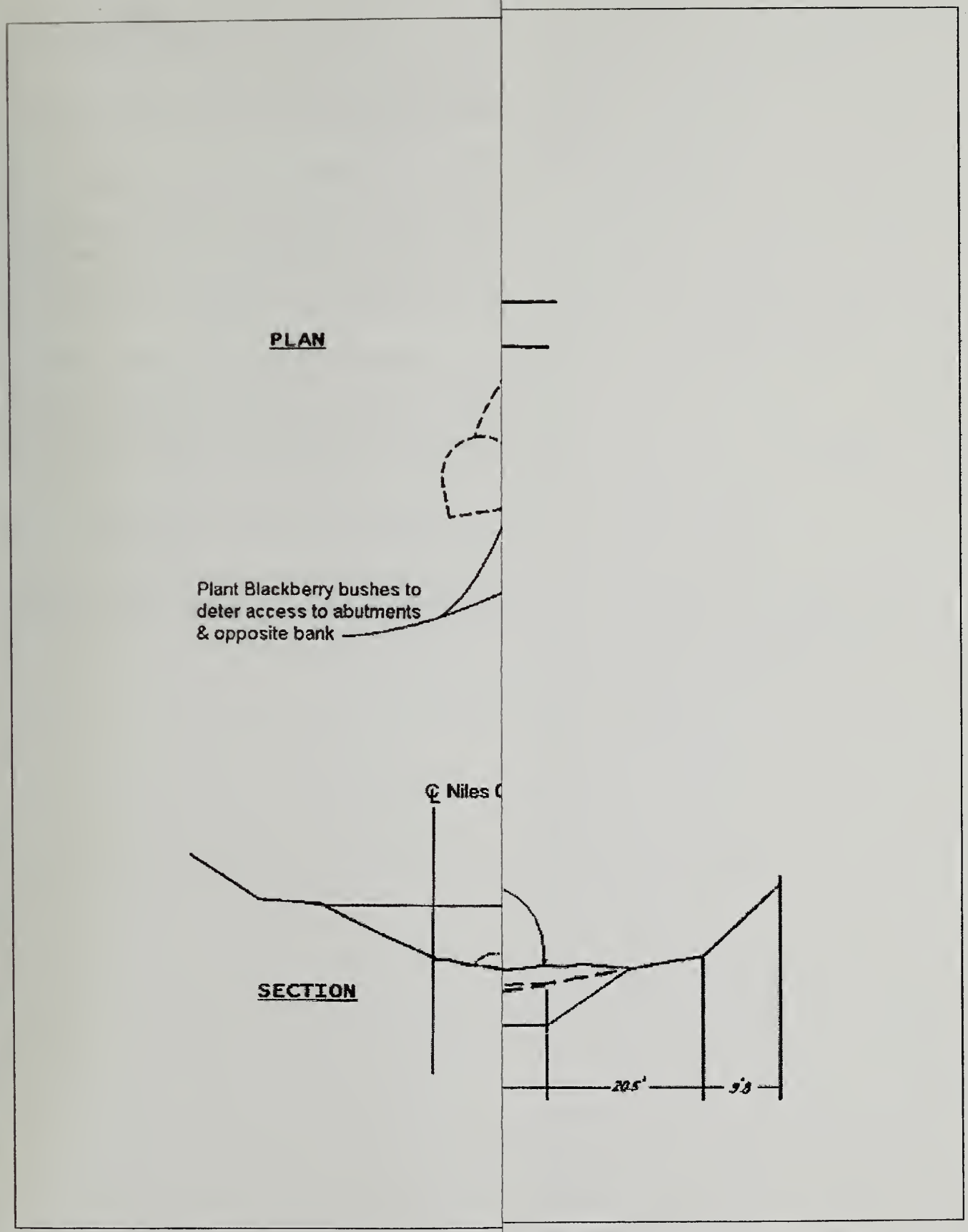
In addition, immediately upstream of where the diversion channel re-enters Alameda Creek and just downstream of the existing dam, native gravels and cobbles would be formed into a low-height dam with a gated, dewatering pipe. The purpose of this feature is to prevent any turbid water that may be produced within the work site or any accidental fuel spills or oil leaks from directly entering Alameda Creek. Straw bales and oil absorbent materials would be placed around the diversion pipe to serve as a filter.

EXTENT OF DAM REMOVAL

To achieve the project objectives, only the middle segment of the dam and the non-functioning fish ladder need to be removed. This section would be removed down to its original foundation as shown on the original drawing. The dam is located in a bend in the creek, so the right abutment (looking downstream) helps to direct the main flows away from the stacked rock retaining wall supporting Niles Canyon Road. If the right abutment were to be removed, then more flow would naturally be directed towards this wall. Scour at the base of the wall could compromise the wall's stability, which would directly affect the ability of Niles Canyon Road to remain open to traffic in both directions. The left abutment is constructed of mortared rock so it may be a part of the original dam construction and is on the inside of the bend in the creek. It does not protrude into the main channel and, therefore, would not be removed. The plunge pool would be filled with sediment taken from either upstream or downstream of the dam.

Concrete debris from Niles Dam would be taken to the Ferma Corporation, which is a concrete recycling facility near the town of Sunol, or it would be trucked to Vasco Road Sanitary Landfill for disposal.

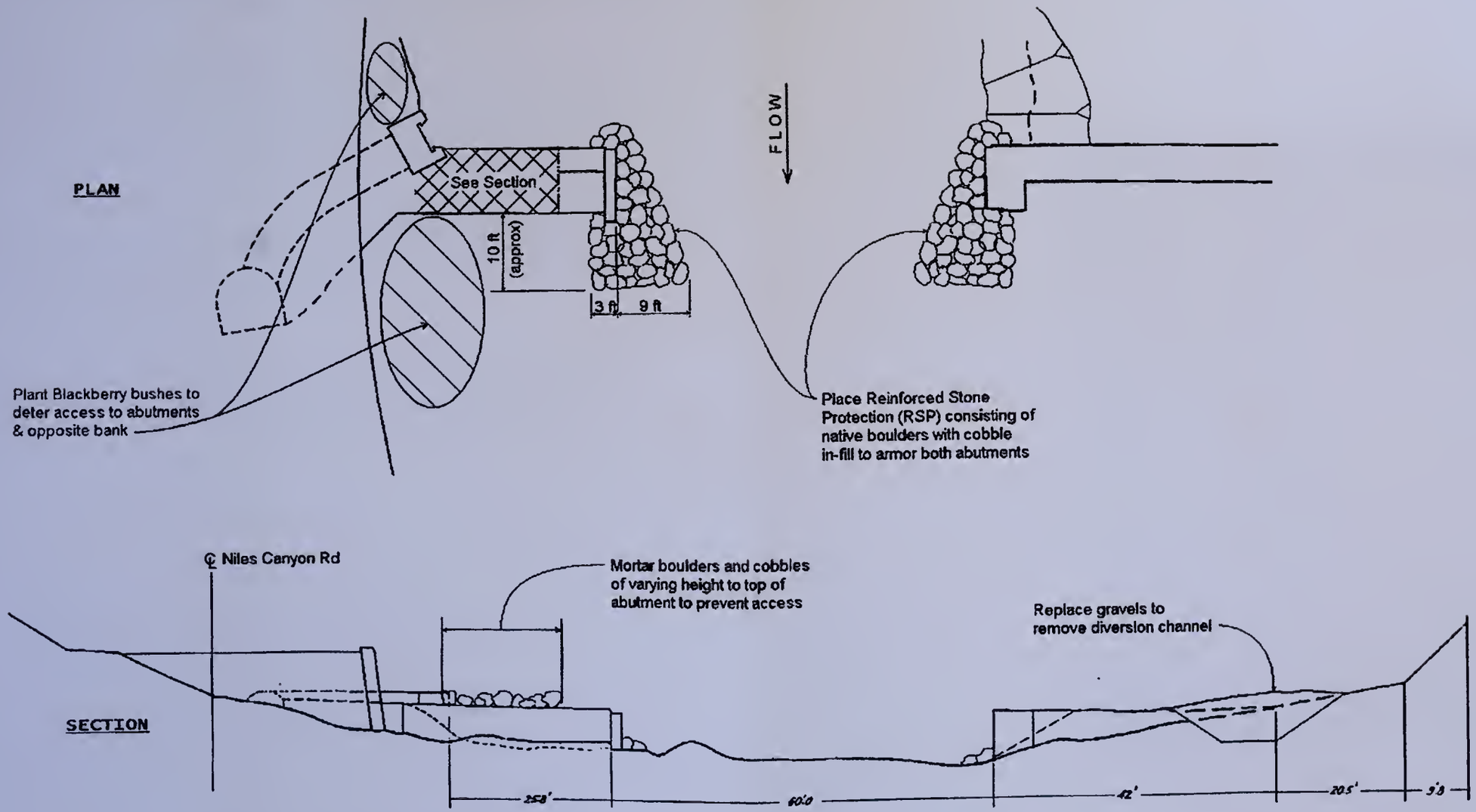
Leaving the two abutments in place would require some armoring to prevent scour or undercutting of the leading edge. A small portion of the concrete fish ladder that was cast against the original right abutment would be left in place. In addition, cobbles and boulders that are on-site can be used to provide armoring without creating a barrier to fish passage. **Figure 8** shows the finished plan and cross-section for Niles Dam.



Sunol-Niles / 201591 ■

SOURCE: HDR Engineering

Figure 8
Niles Dam -
Final Grading and Site Restoration


PLAN
See Section
10 ft (approx)
3 ft
9 ft
FLOW
Plant Blackberry bushes to deter access to abutments & opposite bank
Place Reinforced Stone Protection (RSP) consisting of native boulders with cobble in-fill to armor both abutments
℄ Niles Canyon Rd
Mortar boulders and cobbles of varying height to top of abutment to prevent access
Replace gravels to remove diversion channel
SECTION
25'-8"
60'-0
42'
20.5'
9'-8

SOURCE: HDR Engineering

Sunol-Niles / 201591 ■

Figure 8
Niles Dam -
Final Grading and Site Restoration

STAGING AREA

There is insufficient space to establish a construction staging yard and office at Niles Dam; thus, the staging area at Sunol Dam would also serve as the staging area for Niles Dam (see **Figure 4**).

E. DESCRIPTION OF BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are methods, measures, or practices that are incorporated into the project's design and work plan to avoid, reduce, or minimize a project's effect on environmental resources. They include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. In contrast, mitigation measures under CEQA are generally developed to address specific, significant environmental impacts.

The BMPs that are incorporated into the description of the project are listed in **Table 1**. They should be viewed as a menu of options open to the SFPUC to select from as being the most appropriate for a particular set of problems. Many of the BMPs avoid or minimize effects to more than one environmental resource. In addition, several of the BMPs listed in **Table 1** constitute routine policies and procedures of the SFPUC. The BMPs will also be included in the project's mitigation monitoring plan to ensure their implementation.

F. PROPOSED REMOVAL SCHEDULE

Removal of the dams would begin in May 2006, with work within the banks of Alameda Creek beginning June 2006 and ending October 2006. Activities associated with dam removal would end in November 2006.

TABLE 1
BEST MANAGEMENT PRACTICES INCORPORATED INTO THE PROJECT

Channel Diversion Structures and Dewatering

1. Diversion structures would be constructed. Water would be discharged in a non-erosive manner (e.g., on gravel or vegetated bars, hay bales, plastic, etc.). Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows). Water diversion structures allow the SFPUC to isolate the work area, thereby avoiding or minimizing downstream water quality impacts. If earth is used, the downstream and upstream faces may be covered by a protected covering (e.g., plastic or fabric) to minimize erosion.
2. In conjunction with diversion structures, pumps or gravity-fed pipe systems are used to dewater sites.
3. If high levels of groundwater in a work area are encountered, the water is pumped out of the work site. If necessary, the water would be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment before the water re-enters a creek.
4. When diversion structures are removed, to the extent practicable, the ponded flows would be directed into the low-flow channel within the work site.

Water Quality Protection

5. Silt barriers, such as straw bales, silt fences/curtains or basins are installed, as necessary, downstream of the work sites.
6. Wet sediments may be stockpiled (outside of a live stream) so water can drain or evaporate before removal to minimize water quality impacts. Water is not allowed to drain directly into channels (outside of the work area) or onto city streets without providing water quality control measures.
7. No fueling, cleaning, or maintenance of vehicles or equipment takes place within channel banks to avoid the release of deleterious substances into surface waters. Inspection for leaks would take place on all equipment using fuel or requiring fluids on a daily basis.
8. Trucks may be lined with an impervious material (e.g., plastic), or the tail gate blocked with dry dirt or haybales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out. Water is not allowed to drain directly into channels (outside of the work area) or onto city streets without providing water quality control measures.
9. Streets are cleaned of mud and/or dirt by street sweeping, as necessary, and not by hosing down the street.

Fishery and Aquatic Resources

10. Temporary fills such as for access ramps, diversion structures, or cofferdams are completely removed upon finishing the work.
11. Pump intakes are screened with mesh equal to or less than 3/16 inches to prevent uptake of fish or frogs.
12. In general, work is performed from the spring to fall months when low flows are present in the channels. Work is typically completed by October 15 of any year unless permission from CDFG is received allowing work to continue past this date. By performing work during this period, effects to water quality and aquatic habitats are avoided or minimized.

Traffic Control

13. Construction signs are posted at job sites warning the public of construction work and to exercise caution. When necessary, a person is provided for traffic control. A lane may be blocked off to allow for trucks to pull into and out of the access points.

Noise

14. In general, work is conducted during normal working hours during weekdays. Internal combustion engines would be equipped with adequate mufflers. Excessive idling of vehicles would be prohibited.

II. SUMMARY OF POTENTIAL ENVIRONMENTAL EFFECTS

EFFECTS FOUND TO BE POTENTIALLY SIGNIFICANT

This Initial Study examines the potential effects on the environment of the proposed Sunol/Niles Dam Removal Project. The proposed project would result in significant and unavoidable impacts on historical resources and potentially significant impacts to riparian vegetation and endangered species, which may not be fully mitigatable. Other impacts related to the demolition that may be temporary and mitigatable include: transportation/ circulation, utilities/public services, and water. These potential impacts could potentially be mitigated to less-than-significant levels by incorporation of mitigation measures, to be discussed in the EIR.

EFFECTS FOUND NOT TO BE SIGNIFICANT

The following potential impacts were determined to either result in 'no impact' or a 'less-than-significant' impact: land use, air quality/climate, noise, population, visual quality, and energy/natural resources and hazards. These items are discussed in Section III, below, and will not be analyzed further in the EIR.

III. ENVIRONMENTAL EVALUATION CHECKLIST AND DISCUSSION

ENVIRONMENTAL EVALUATION CHECKLIST
(Initial Study Checklist)

A. COMPATIBILITY WITH EXISTING ZONING AND PLANS	Not Applicable	Discussed
1) Discuss any variances, special authorizations, or changes proposed to the City Planning Code or Zoning Map, if applicable.	X	
2) Discuss any conflicts with any adopted environmental plans and goals of the City or Region, if applicable.	X	X

The City and County of San Francisco, as a chartered city and county, and the San Francisco Public Utilities Commission (SFPUC), as a public utility, receive intergovernmental immunity under California Government Code Sections 53090 et seq. Such immunity exempts the extraterritorial lands owned by the City and County of San Francisco, through its SFPUC, from the planning and building laws of any other city or county in which those lands are located. Thus, the zoning and building codes, general plans, specific plans, and other planning and building policies of Alameda County, or various regional plans, do not apply to this project. The SFPUC has authority over the management, use, and control of its extraterritorial lands under the San Francisco City Charter, Section 4.112.

San Francisco's planning and building laws, to the extent that they apply to San Francisco's extraterritorial lands, could be applicable to the project site, as long as they do not conflict with the SFPUC's charter responsibilities. Similarly, the San Francisco General Plan applies primarily to lands within the City and County of San Francisco, and there are no specific policies directed to areas outside of these boundaries although general environmental resource policies in the General Plan could be applicable to the project site. There are no existing habitat conservation or natural community plans in the area.

Local plans and policies will be discussed in the EIR. In general, however, potential conflicts with the planning laws of other jurisdictions are considered by the decision-makers independently of the environmental review process as part of the decision to approve, modify, or disapprove a project.

In April 2001, the SFPUC published the Alameda Watershed Management Plan (Plan). The primary goal of the Plan is to "maintain and improve source water quality to protect public health and safety." Relevant, to this project, secondary goals are: 1) maximize water supply and 2) preserve and enhance the ecological and cultural resources of the watershed. The Plan requires the development of a Habitat Conservation Plan (HCP) to mitigate impacts that on-going operations and maintenance activities may have on plants and wildlife. The EIR will discuss any conflicts with the Plan and the proposed HCP.

B. ENVIRONMENTAL EFFECTS – Could the project:

For items on the Initial Study checked "No" without discussion, the conclusions regarding no potential adverse environmental effects are based on field observation, staff and consultant experience on similar projects, and standard reference material available within the Planning Department.

1) Land Use	YES	NO	DISCUSSED
(a) Disrupt or divide the physical arrangement of an established community?		X	X
(b) Have any substantial impact upon the existing character of the vicinity?		X	X

The proposed project involves the removal of dams on Alameda Creek for the purpose of removing two fish passage barriers and reducing public safety hazards and related liability issues. The project is compatible with existing land uses and will not disrupt or divide any established communities or have an adverse effect on the existing character of the area. Furthermore, for the reasons stated above, the project will not contribute to any cumulative land use impacts. No environmental effects on land use would occur; thus, land use will not be analyzed further in the EIR.

2) Visual Quality			
(a) Have a substantial, demonstrable negative aesthetic effect?		X	
(b) Substantially degrade or obstruct any scenic view or vista now observed from public areas?		X	X
(c) Generate obtrusive light or glare substantially impacting other properties?		X	X

Sunol Dam is not visible from any public areas, including Highway 84. Removing Sunol Dam would restore the natural flow of Alameda Creek and would not have a negative aesthetic effect on the surrounding area. The EIR will not further analyze visual quality in the vicinity of Sunol Dam.

Niles Dam is visible from Highway 84. The proposed project involves the removal of the middle section of the dam. Once the middle section of the dam is removed, the artificially impounded area behind would be replaced with a more natural stream channel, and would appear similar to the downstream configuration. This change from an artificial pool to a natural archetype would not substantially degrade the scenic view of this portion of Alameda Creek. The EIR will not further analyze this impact on visual quality.

To remove Niles Dam, however, trees would need to be removed to gain access to Alameda Creek (see **Figure 7**). The trees alongside Highway 84 are predominately willows (*Salix* sp), which would regrow once removal is complete. The area on the opposite bank contains mature oak trees (*Quercus* sp.), some of which may be removed. Although the exact number of oak trees are not known at this time, given the total number of oaks, and other mature hardwoods along this reach of Alameda Creek, a substantial number of trees would not be removed. Although this is considered a less-than-significant impact, Mitigation Measure 1 – Tree Replacement, p. 31 of this Initial Study, requires that willow poles would be planted upstream of Niles Dam along Highway 84 and oaks and other hardwood trees removed would be replaced at a ratio of at least 3:1 (that is, for every one tree removed, three would be planted). This mitigation measure would further reduce visual quality impacts in the vicinity of Niles Dam. The EIR will not further analyze impacts on visual quality in the vicinity of Niles Dam.

If sediment is to be removed, it may be necessary to perform the task during nighttime hours to avoid traffic impacts on Highway 84. This action would generate light during the sediment removal phase (approximately a 16 week period for Sunol and a four week removal period for Niles), but it would not substantially affect other properties because the adjoining properties by Sunol Dam are plant nurseries. Niles Dam is located in a narrow canyon with no nearby residences that could be affected by nighttime work. Obtrusive light will not be analyzed further in the EIR.

3) Population		YES	NO	DISCUSSED
(a)	Induce substantial growth or concentration of population?		X	X
(b)	Displace a large number of people (involving either housing or employment)?		X	X
(c)	Create a substantial demand for additional housing in San Francisco, or substantially reduce the housing supply?		X	X

The proposed project involves the removal of dams on Alameda Creek for the purpose of restoring fish passage and reducing public safety hazards and related liability issues. It does not involve the construction of any facilities that would induce population growth, nor would it displace any residents or jobs. Furthermore, for the reasons stated above, the project would not contribute to cumulative population growth. No environmental effects related to population growth or displacement would occur; thus, population will not be analyzed further in the EIR.

4) Transportation/Circulation				
(a)	Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system?		X	X
(b)	Interfere with existing transportation systems, causing substantial alterations to circulation patterns or major traffic hazards?		X	X
(c)	Cause a substantial increase in transit demand which cannot be accommodated by existing or proposed transit capacity?		X	
(d)	Cause a substantial increase in parking demand which cannot be accommodated by existing parking facilities?		X	

According to Caltrans (2002), the average annual daily traffic on Highway 84 is 7,700 vehicles at the intersection of Sunol/Pleasanton Road. At the intersection of Highway 84 and Fremont, north of Highway 238, the average annual daily traffic volume on Highway 84 is 15,800 vehicles. Construction vehicles would use these roadways to approach the project sites. Typical equipment for dam and sediment removal consists of excavators, bulldozers, grader, backhoe, small skid steer, 10-cy and 20 cy dump trucks, and a water truck. In addition, workers would commute to the project sites in their personal vehicles. The EIR will evaluate traffic impacts associated with construction vehicles, including potential traffic hazards associated with the ingress and egress of slow-moving construction vehicles onto Highway 84, and the possible removal of sediment during nighttime hours. A BMP for traffic control will be incorporated into the project description in the EIR (see #13, **Table 1**). The EIR will analyze transportation and circulation impacts and will identify mitigation measures, if warranted, for these potential impacts.

5) Noise				
(a)	Increase substantially the ambient noise levels for adjoining areas?		X	X
(b)	Violate Title 24 Noise Insulation Standards, if applicable?		X	
(c)	Be substantially impacted by existing noise levels?		X	

During dam removal, demolition equipment and increased vehicular traffic would cause a temporary increase in ambient noise levels. There are, however, no sensitive receptors in the area adjoining Niles Dam; thus, noise will not be analyzed further in the EIR for Niles Dam.

Sunol Dam is in proximity to several plant nurseries and the Town of Sunol, however, the nearest buildings, which are located across the railroad tracks and Highway 84, are approximately 2,000 feet away from Sunol Dam; thus, the

predominate existing noise source for these buildings is Highway 84. BMP number 14 (see **Table 1)** will be implemented to avoid noise impacts from the additional trucks accessing the site by requiring that work be performed during normal working hours and mufflers be placed on all internal combustion engines, and by prohibiting excessive idling. After implementation of the BMPs, the project will not result in any noise-related impacts and will not contribute to any cumulative noise impacts; thus, noise will not be analyzed further in the EIR.

6)	Air Quality/Climate	YES	NO	DISCUSSED
(a)	Violate any ambient air quality standard or contribute substantially to an existing or projected air quality violation?		X	X
(b)	Expose sensitive receptors to substantial pollutant concentrations?		X	
(c)	Permeate its vicinity with objectionable odors?		X	
(d)	Alter wind, moisture or temperature (including sun shading effects) so as to substantially affect public areas, or change the climate either in the community or region?		X	

The project site is located within the nine-county San Francisco Bay Area Air Basin (Air Basin). The entire Air Basin is designated as "nonattainment" with respect to the state and national standards for ozone, and with respect to the state PM-10 standard. Air quality plans have been adopted outlining measures to achieve attainment status for these pollutants. The Air Basin falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD), the regional agency empowered to regulate air pollutant emissions from stationary sources in the Bay Area. BAAQMD regulates air quality through its permit authority over most types of stationary emission sources and through its planning and review activities.

Dam removal activities, including vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust, would generate fugitive dust[7] (including particulate matter less than 10 microns in size or PM-10) and other criteria air pollutants[8]. The BAAQMD's approach to analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions (BAAQMD, 1997). The BAAQMD has identified a set of feasible PM-10 control measures for construction activities, which are listed under Mitigation Measure 2– Air Quality, on p. 31 of this Initial Study and include watering all active construction areas at least twice daily; covering all trucks hauling soil, sand, and other loose materials, or requiring all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer; paving, applying water three times daily, or applying non-toxic soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites; sweeping daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites; and, sweeping streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets. The determination of significance with respect to construction emissions is based on implementation of these control measures. With implementation of the BAAQMD's recommendations for dust control (see Mitigation Measure 2 – Air Quality, on p. 31 of this Initial Study), the project's air quality impacts during dam removal are considered less-than-significant.

BAAQMD CEQA Guidelines (BAAQMD, 1997) recognize that construction equipment emit carbon monoxide and ozone precursors. The guidelines indicate that such emissions are included in the emission inventory, which

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7 "Fugitive" emissions generally refer to those emissions that are released to the atmosphere by some means other than through a stack or tailpipe.

8 Criteria air pollutants are pollutants for which the federal or state government has established ambient air quality standards, or criteria, for outdoor concentration to protect public health. Criteria air pollutants include ozone, carbon monoxide, sulfur dioxide PM-10, nitrogen oxide, and lead.

provides the basis for regional air quality plans, and that emissions are not expected to impede attainment of ozone standards in the Bay Area.

After the dams are removed, the SFPUC may periodically check the status of the creek's flow, bank stability, and sediment level. However, these vehicle trips to and from the project site are part of the SFPUC's existing watershed maintenance activities. Thus, no impact on air quality would occur during the project's operation/maintenance phase.

For the reasons discussed above and with implementation of Mitigation Measure 2 – Air Quality, impacts on air quality will not be analyzed further in the EIR.

7)	**Utilities/Public Services**	**YES**	**NO**	**DISCUSSED**
(a)	Breach published national, state or local standards relating to solid waste or litter control?		X	X
(b)	Extend a sewer trunk line with capacity to serve new development?		X	
(c)	Substantially increase demand for schools, recreation or other public facilities?		X	
(d)	Require major expansion of power, water, or communications facilities?		X	X

If the sediment removal option is selected, the sediment behind the dams, which consists of gravels and cobbles, would be off-hauled to either the upstream gravel operations (e.g., Ferma Corporation) or to a landfill (e.g., Vasco Road Sanitary Landfill) or possibly a combination of the two. These landfills and gravel operations have sufficient capacity for the sediment. If the impounded material is left in place, the disposal options would not be needed. Because of the results of the sediment testing and background research, it is unlikely that sediment quality would be an issue in selecting either option; however, since the sediment was not tested to the full depth, the proposed mitigation measure to address the disposal of sediment is included as Mitigation Measure 3 (p. 32 of this Initial Study), which requires the testing of sediment before off-hauling. The EIR will evaluate the environmental effects of both sediment management options as part of the proposed project.

The aqueduct associated with Sunol Dam is no longer used for the distribution of water. Niles Dam has not been used for decades. The SFPUC uses a different delivery system; thus, the removal of the dams would not result in the construction or expansion of water facilities. The expansion of water facilities will not be analyzed further in the EIR.

8)	**Biology**			
(a)	Substantially affect a rare or endangered species of animal or plant or the habitat of the species?	X		X
(b)	Substantially diminish habitat for fish, wildlife or plants, or interfere substantially with the movement of any resident or migratory fish or wildlife species?	X		X
(c)	Require removal of substantial numbers of mature, scenic trees?	X		X

The proposed project site provides suitable habitat for several special-status plant and animal species. Potential impacts resulting from project activities include temporary removal of vegetation, direct mortality, harassment due

to noise and temporary increased human presence, and reproductive failure. Project activities may have the potential to affect several special-status species.

Plants

The project site provides suitable habitat for two federally listed plant species, large-flowered fiddleneck (*Amsinckia grandiflora*) and showy Indian clover (*Trifolium amoenum*). Large-flowered fiddleneck is known to occur in only three locations in California, the nearest location being Lawrence Livermore Lab, approximately 10 miles northeast of the project site. Showy Indian clover is known to occur only in Sonoma and Marin counties. While suitable habitat exists within the vicinity of the project site, these species have not been observed during appropriately timed botanical surveys. Showy Indian clover was recently rediscovered after being thought extinct; therefore, a broader consideration of its potential occurrence is warranted.

The project site provides moderately suitable habitat for four other special-status plant species: big tarplant (*Blepharizonia plumosa* ssp. *plumosa*), Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*), western leatherwoord (*Dirca occidentalis*), and Diablo helianthella (*Helianthella occidentalis*). None of these four species have been observed during appropriately timed botanical surveys.

Wildlife

Steelhead. The fisheries resources of the Alameda Creek watershed have been studied in considerable detail during the past decade. Although federally threatened central California coast steelhead (*Oncorhynchus mykiss*) have historically utilized Alameda Creek, much of the watershed is currently inaccessible to the species due to the presence of various migration barriers, including the BART weir in Fremont. The Niles and Sunol dams are located upstream of the BART weir. Steelhead are, therefore, highly unlikely to occur within the proposed project areas. Recent fish surveys of the Niles Canyon area of Alameda Creek did not find any steelhead. However, Pacific lamprey (*Lampetra tridentata*), a federal Species of Concern, is known to occur both in the lower and upper Alameda Creek watershed and Pacific lamprey (ammocoetes) were found at Niles Dam.

Considerable effort is being directed towards restoring the Alameda Creek watershed, particularly the removal of total and partial migration barriers. Although Niles and Sunol dams are located upstream of the BART weir barrier, future restoration projects may ultimately enable steelhead to migrate beyond the weir. The proposed removal of the two dams would likely have long-term beneficial impacts on steelhead and Pacific lamprey by making several miles of quality habitat in the upper watershed available to the species. The EIR will assess the potential short-term impacts to fish species, such as increased sedimentation and water quality deterioration of downstream habitat. The EIR will identify mitigation measures for these potential impacts, including fish capture and relocation from the project area to suitable nearby habitat, spill prevention plans, and post-project revegetation.

Activities related to dam removal, such as dewatering of Alameda Creek, in-channel construction, and sediment removal activities, have the potential to temporarily affect steelhead downstream of the project area. The EIR will assess and address potential impacts to this species. Overall, implementation of the proposed project would result in beneficial impacts for this species.

Resident Rainbow Trout. On June 14, 2004, the National Marine Fisheries Service (NOAA Fisheries) published a proposed rule in the Federal Register regarding the proposed listing determination of 27 evolutionary significant units (ESUs) of west coast salmonids (NOAA Fisheries, 2004). In the proposed rule, it was noted that recent genetic evidence strongly suggest that resident rainbow trout (*O. mykiss*) in the area of the proposed project are part of the Central California Coast ESU. The EIR will discuss and assess impacts to resident rainbow trout as well as identify mitigation measures, if warranted.

California red-legged frog. The proposed project has the potential to result in adverse impacts to California red-legged frog (*Rana aurora draytonii*) at the Sunol Dam project site. California red-legged frog (CRLF) is a federally listed Threatened Species and a California Species of Special Concern and known breeding habitat occurs in the drainage pond adjacent to the access road at Sunol Dam. Upland habitat within the Sunol Dam project area may provide upland aestivation habitat for this species. No CRLF were identified at the Niles Dam site. Potential impacts to this species resulting from project activities would include mortality, destruction of upland aestivation habitat, temporary disturbance due to noise and increased human presence, and reproductive failure. The EIR will discuss and assess impacts to CRLF as well as identify mitigation measures.

Alameda Whipsnake. Alameda whipsnake (*Masticophis lateralis euryxanthus*) is a federally Threatened Species with designated critical habitat, and a California Threatened Species. Though generally thought to inhabit shrub and coast scrub communities, Alameda whipsnake (AWS) frequently migrate into adjacent habitats including grasslands, oak savanna, and occasionally oak-bay woodland. The scrub habitat located immediately north of Highway 84 at the Niles Dam project site provides suitable habitat for this species. No habitat for AWS was observed at the Sunol Dam site. Project activities do not present potential for direct impacts to this species, but incremental vehicle traffic could result in indirect impacts to this species, including restricting dispersal of individuals and/or temporary disturbance of upland habitat. The proposed mitigation measure to address the temporary disturbance of upland habitat is included in the Mitigation Measure section, p. 32 of this Initial Study. Specifically, mitigation measure number 4 requires post-project revegetation of the AWS habitat that is disturbed during dam removal activities. Potential impacts and additional mitigation measures, if warranted, will be evaluated in the EIR.

Other Special-status Wildlife Species. Dewatering, sediment removal and in-channel construction activities have the potential to directly and indirectly affect the following special status species: foothill yellow-legged frog (*Rana boylii*), western pond turtle (*Clemmys marmorata*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), and Pacific lamprey (*Lampetra tridentate*). Impacts may include temporary removal of vegetation, temporary harassment due to noise and increased human presence, direct mortality, and reproductive failure. The EIR will discuss and assess impacts to these species as well as identify mitigation measures, if warranted.

Nesting Birds and Raptors. Several birds and raptors with potential to occur in the vicinity of the project area are considered special-status species, including sharp-shinned hawk and Cooper's hawk, both of which are California species of special concern, and great blue heron (nesting). The great blue heron is a CDFG special animal and there is a known rookery within the Sunol Dam project site (see **Figure 4**). Construction activities, including grubbing and tree clearing activities, may result in impacts to nesting and breeding birds, including raptors. Impacts include loss of nesting and breeding habitat, foraging and nesting materials, temporary disturbance due to noise and increased human presence, direct mortality, and nest abandonment and reproductive failure. The EIR will assess impacts to these species and propose mitigation measures, if warranted.

Nesting, Roosting, and Breeding Bats. Five special-status bat species (all of which are federal species of concern) have at least moderate potential to occur within the vicinity of the project area. Construction activities, including site clearing and tree removal, have the potential to cause indirect impacts to these species. The EIR will assess impacts to these species and propose mitigation measures, if warranted.

Wetlands and Riparian Habitat

The project boundaries are within the riparian corridor of Alameda Creek. A preliminary wetland assessment indicates that Alameda Creek falls under Corps jurisdiction as non-wetland waters of the U.S. and under CDFG jurisdiction as a stream. Other jurisdictional wetlands are located within the project study boundaries and would be

considered under Sections 404 and 401 of the federal Clean Water Act. These features also fall under the jurisdiction of the California Porter-Cologne Act as waters of the state, which are regulated by the State Water Resources Control Board (SWRCB) and San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). The proposed project involves permanent and temporary impacts to these resources. Impacts to wetlands include temporary dewatering, sediment removal, removal of vegetation and alteration of instream channel structure. Project activities in these areas would require Corps 404 permits, a CDFG 1601 Streambed Alteration Agreement and a SFBRWQCB 401 Water Quality Certification or a Waste Discharge Requirement under the Porter-Cologne Act. Impacts to wetlands and riparian habitat are expected to be temporary and the EIR will assess impacts to these resources.

The proposed project has the potential to impact the riparian corridor in the event of accidental oil or gasoline spill, sediment or debris release, or other water quality contamination to Alameda Creek. The EIR will examine the above potential impacts and identify mitigation measures to address adverse impacts to riparian habitat.

Wildlife Corridors

The proposed project has the potential to temporarily affect wildlife corridors during project activities, such as the dewatering of Alameda Creek upstream and downstream of the both Sunol and Niles dams. These activities may restrict the movement of fish and other wildlife species, including special-status species. Other project activities, including equipment storage, construction of access roads, and temporary increase in noise and human presence, may result in the temporary restriction of migratory corridors and nesting/breeding/roosting sites for wildlife species. Temporary dewatering and sediment removal activities have the potential to adversely affect the western pond turtle and potentially interfere with their migratory or dispersal corridors. Impacts include removal of vegetation and nesting habitat and removal of instream habitat characteristics (i.e. nesting or basking sites). Project activities may result in abandonment of breeding and nesting sites for birds, including raptors, and special status bats. The EIR will examine the extent of the impact on these species and develop measures to reduce or eliminate impacts.

Mature, Scenic Trees

The proposed project requires the removal of a limited number of trees and other vegetation to allow for equipment access to the dam sites. CDFG has jurisdiction over vegetation removal within significant plant communities, including riparian habitat. The removal of riparian vegetation, including mature trees, at specific locations within the project area is subject to CDFG policies regarding the protection of significant plant communities as well as requirements of Section 1601 of the Fish and Game Code (Streambed and Lake Alteration Agreement). Minimal trimming and removal of selective trees, shrubs and other vegetation would be required to provide heavy equipment access to the work areas. The EIR will assess project-related impacts to mature, scenic trees.

9)	**Geology/Topography**	**YES**	**NO**	**DISCUSSED**
(a)	Expose people or structures to major geologic hazards (slides, subsidence, erosion and liquefaction).		X	X
(b)	Change substantially the topography or any unique geologic or physical features of the site?		X	X

The project site is located in an area subject to various geologic hazards, including earthquakes, surface fault rupture, landslides, liquefaction, erosion, and/or subsidence. The EIR will assess whether the removal and future absence of the dam structures could potentially cause or exacerbate geologic or seismic hazards that would expose people to risk over that which currently exists at the project site. The Sunol and Niles dams provide localized slope

stability by exerting lateral support to the rock and soil canyon walls, engineered highway embankments, and dam abutments. Removing these dams may locally alter the stability of the natural and artificial support in the adjacent side slopes, remaining abutments, and road embankments. Removing lateral support may compromise the integrity of the geologic materials at the dam sites to a degree that increases susceptibility to ground failure during an earthquake. Alteration in the support structure and compromising the integrity of the adjacent cliffs could trigger gravity-induced and/or earthquake-induced landslides, erosion, or other geologic hazards. The EIR will evaluate the potential for geologic hazards due to the proposed dam removal.

Removal of the Sunol and Niles dams and restoration of the stream channel profile would return Alameda Creek to a condition more representative of its original, free-flowing condition. Other than this beneficial effect, implementation of the proposed project would not affect the area's topography or geologic features. The EIR will not address the effects of the project on topography or any unique geologic or physical features.

10) **Water**	YES	NO	DISCUSSED
(a) Substantially degrade water quality, or contaminate a public water supply?		X	X
(b) Substantially degrade or deplete ground water resources, or interfere substantially with ground water recharge?		X	X
(c) Cause substantial flooding, erosion or siltation?		X	X

Dam removal activities would involve soil disturbance, earthmoving, and potential release of impounded sediment accumulated in the upstream portion of both dams. There are two options under consideration regarding impounded sediments. Sediment can either be removed and disposed of in an upland location, or the sediment would remain in the creek channel and gradually erode by the natural flow patterns of Alameda Creek. If the first option were adopted, little or no increased sediment loads in Alameda Creek would occur because the bulk of the sediment would be removed as part of the project. If the second option were selected, sediment load in Alameda Creek would temporarily increase as the impounded sediments erode and move downstream, but water quality would return to background levels once the creek reestablishes equilibrium. At Sunol Dam, impounded sediments have been chemically tested and do not contain potentially hazardous substances within detectable limits. However, additional sampling and testing of the materials would be performed during the sediment removal option of the project. The final destination of the materials would depend on the results of the additional testing. Under the sediment left in place option, the sediment would move downstream. The EIR will address potential water quality impacts for each sediment option.

The EIR will not evaluate impacts to public water supply because there are no facilities in the project area or downstream.

Another potential impact on water quality is the potential effects due to the in-stream activities necessary to remove the dams and sediment, if this option is chosen; however, BMPs numbers 1 through 9 would address water quality impacts during dam removal (see **Table 1**). These measures include constructing water diversion structures to dewater the work area, pumping water out of the work area, pumping turbid water into infiltration basins so sediments can settle out, constructing downstream silt barriers to capture sediment that may leave the work area, stockpiling of wet sediments where decant water can not re-enter Alameda Creek, prohibitions against fueling, cleaning or maintaining vehicles within the channel banks so as to avoid spills, recommendations for the off-hauling of sediments, and street cleaning.

The volume, depth, and extent of currently impounded water may directly affect local groundwater levels at Sunol Dam because the removal of Sunol Dam would release impounded water to the natural drainage of Alameda Creek. Thus, releasing this impounded water could affect shallow water table aquifers by lowering the average groundwater depth, which may affect groundwater resources, such as reducing available groundwater to the root zone of trees, lowering water levels below the maximum pumping depths of wells in the vicinity, altering existing groundwater flows and gradients or lowering the water in the ponds where California red-legged frogs exist. The EIR will evaluate project-related, potential impacts to groundwater in the proposed project area.

Existing stream flows would change upon the removal of the dams that may change erosion patterns, which could contribute to erosion and siltation impacts. Therefore, because of the potential for sediment transport, the EIR will evaluate potential impacts associated with erosion and siltation.

Removal of the Sunol and Niles dams would change the flow regime of Alameda Creek due to the absence of the two flow retention structures. The EIR will evaluate the potential for flooding.

11) Energy/Natural Resources	YES	NO	DISCUSSED
(a) Encourage activities which result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner?		X	X
(b) Have a substantial effect on the potential use, extraction, or depletion of a natural resource?		X	X

Removal of the dams would not result in the use of large amounts of energy. There would be a temporary increase in energy use for dam removal, which would end upon completion of the project. Removal of the dams would not use or deplete natural resources. Energy and natural resources will not be analyzed further in the EIR.

12) Hazards			
(a) Create a potential public health hazard or involve the use, production or disposal of materials which pose a hazard to people or animal or plant populations in the area affected?		X	X
(b) Interfere with emergency response plans or emergency evacuation plans?		X	X
(c) Create a potentially substantial fire hazard?		X	

Dam removal activities typically involve the use of equipment fueled by petroleum products, which may be hazardous to the aquatic environment if released. BMP (number 7) for potential hazardous materials impacts is incorporated into the project description in the EIR (see **Table 1**). This BMP prohibits the fueling, cleaning or maintenance of vehicles or equipment within the banks of Alameda Creek, thereby avoiding the release of deleterious substances into areas where they could enter the water column. BMP number 7 also calls for the daily inspection of vehicles and equipment for leaks. Vehicles or equipment could not be used until repaired.

The project would not interfere with emergency response or evacuation plans. Work at the project sites would mostly be confined to Alameda Creek. Traffic control would be provided at both dam sites (see #4 above). This issue will not be discussed further in the EIR.

13) Cultural	YES	NO	DISCUSSED
(a) Disrupt or adversely affect a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group; or a paleontological site except as a part of a scientific study?	X		X
(b) Conflict with established recreational, educational, religious or scientific uses of the area?		X	
(c) Conflict with the preservation of buildings subject to the provisions of Article 10 or Article 11 of the City Planning Code?		X	

Both dams appear to meet the criteria for listing in the National Register of Historic Places; thus, they are considered historical resources for the purposes of CEQA. In addition, the Sunol Dam is designated as a Historical Civil Engineering Landmark. The EIR will discuss the significance of these historic resources and how the project could affect their historic significance. It will also discuss potential mitigation measures that may be available to lessen the severity of the impact.

Another possible historic feature, Joyland Park, which is found in association with Niles Dam, is one of about 10 general picnicking and amusement parks in the area, which were popular from the 1870s to the 1930s. Joyland Park reportedly includes a drinking fountain and a picnic area and potentially lies in an area to be used for demolition staging. Potential impacts and mitigation measures for Joyland Park will be discussed in the EIR.

C. MITIGATION MEASURES	YES	NO	N/A	DISCUSSED
1) Could the project have significant effects if mitigation measures are not included in the project?	X			X
2) Are all mitigation measures necessary to eliminate significant effects included in the project?	X			X

The following mitigation measures are necessary to avoid or reduce the adverse effects of the project. The EIR will describe additional mitigation measures, as necessary.

VISUAL QUALITY

Mitigation Measure 1 – Tree Replacement

Willow poles would be planted upstream of Niles Dam along Highway 84. Oaks and other hardwood trees removed along the opposite bank would be replaced at a ratio of at least 3:1 (that is, for every one tree removed, three would be planted).

AIR QUALITY/CLIMATE

Mitigation Measure 2 – BAAQMD Feasible Control Measures for Construction Emissions of PM-10

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer.
- Pave, apply water three times daily, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

UTILITIES/PUBLIC SERVICES

Mitigation Measure 3 – Sediment Quality

Additional samples would be collected from the excavated/stockpiled materials and tested, before off-hauling any of the materials. The final destination of the materials would depend on the results of the additional testing.

BIOLOGY

Mitigation Measure 4 – Alameda Whipsnake

Post-project revegetation would replace the habitat disturbed during dam removal activities.

D. OTHER	YES	NO	DISCUSSED
Require approval and/or permits from City Departments other than Department of City Planning or Bureau of Building Inspection, or from Regional, State or Federal Agencies?	X		X

Permits would be required from CDFG, SFBRWQCB, U.S. Army Corps of Engineers, and Caltrans.

IV. ALTERNATIVES

The EIR will analyze alternatives to the project that would reduce or eliminate any significant environment effects. These alternatives are expected to include:

1. No Project (No demolition) Alternative. The existing dams would remain, continuing to deteriorate, increasing the risk of failure and blocking passage to upstream fish migration. In addition, the dams would still be considered an attractive nuisance and public safety hazard, posing a potential liability to the City and County of San Francisco.

2. Retain Dams and Install Fish Passageways. The existing dams would remain but fish passageways, such as flumes with baffles or series of stepped pools would be installed.

E. MANDATORY FINDINGS OF SIGNIFICANCE	YES	NO	DISCUSSED
1) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or pre-history?	X		X
2) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals?			
3) Does the project have possible environmental effects which are individually limited, but cumulatively considerable? (Analyze in the light of past projects, other current projects, and probable future projects.)		X	X
4) Would the project cause substantial adverse effects on human beings, either directly or indirectly?		X	X

The EIR would discuss the above mandatory findings of significance in detail.

F. ON THE BASIS OF THIS INITIAL STUDY

___ I find the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared by the Department of City Planning.

___ I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because the mitigation measures, numbers _____, in the discussion have been included as part of the proposed project. A NEGATIVE DECLARATION will be prepared.

_X_ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Paul Maltzer
Environmental Review Officer

for

Gerald G. Green
Director of Planning
Planning Department

DATE:

REFERENCES

All references are available for review by appointment as part of the project environmental file at the Planning Department, 1660 Mission Street, in Project File No. 2001.1149E.

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_____, October 20, 2003. http://www.spn.usace.army.mil:/regulatory/regper.html.

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Interagency Meeting

The project was presented at the Corps Interagency Meeting on October 8, 2003. The meeting was attended by the following agency representatives: Janice Gan (CDFG), Molly Martindale (Corps), Audrey Liu (EPA), and Dale Bowyer (SFBRWQCB).

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APPENDIX B

Final Report for Channel Geomorphology Study Niles and Sunol Dam Removal Project, Alameda County, California

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FINAL REPORT

for

CHANNEL GEOMORPHOLOGY STUDY
NILES AND SUNOL DAM REMOVAL PROJECT
ALAMEDA COUNTY, CALIFORNIA

prepared for

Project Management Bureau
San Francisco Public Utilities Commission
1155 Market Street
San Francisco, California

SUNOL DAM

NILES DAM

October 12, 2004

Weiss Associates *Environmental Science, Engineering and Management*

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October 12, 2004

Ms. Barbara Palacios, PE
Project Management Bureau
San Francisco Public Utilities Commission
1155 Market Street, 6th Floor
San Francisco, California 94103

RE: Final Report for
Channel Geomorphology Study
Niles and Sunol Dam Removal Project,
Alameda County, California
Weiss Project No. 322-1682

Dear Ms. Palacios:

Weiss Associates (Weiss) is pleased to provide you with the enclosed Final Report for Channel Geomorphology Study for the Niles and Sunol Dam Removal Project, Alameda County, California, October 12, 2004, for your use and distribution. We have provided a Summary at the beginning of this Final Report that extracts and highlights key items. The Consultant Team (Weiss Associates and ENTRIX, Inc.) wish to thank both you and other involved SFPUC and Agency staff for your support during this Study.

Should any SFPUC or Agency staff have questions, please contact me at 510 450 6145 or JM@Weiss.com. Thank you for the opportunity to assist the SFPUC.

Sincerely,
Weiss Associates

Jerry McHugh, PE
Principal Engineer

Enclosures: Final Report for Channel Geomorphology Study, Niles and Sunol Dam Removal Project

JM:jm

Weiss Associates *Environmental Science, Engineering and Management*

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FINAL REPORT

for

CHANNEL GEOMORPHOLOGY STUDY NILES AND SUNOL DAM REMOVAL PROJECT ALAMEDA COUNTY, CALIFORNIA

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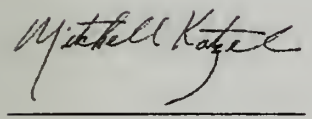

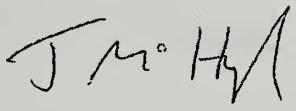

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This Channel Geomorphology Study for the San Francisco Public Utilities Commission (SFPUC) was conducted under our supervision. To the best of our knowledge, the data contained herein are true and accurate and satisfy the scope of work prescribed by the client for this project. The data, findings, recommendations, specifications or professional opinions were prepared solely for the use of in accordance with generally accepted professional scientific and engineering practice. We make no other warranty, either expressed or implied, and are not responsible for the interpretation by others of the contents herein.

October 12, 2004

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Appendix A Study Team

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ACRONYMS

ACFCWCD	Alameda County Flood Control and Water Conservation District
ACFRW	Alameda Creek Fisheries Restoration Workgroup
CCFS	City and County of San Francisco
CDFG	California Department of Fish and Game
CER	Conceptual Engineering Report
cfs	cubic ft per second
CIP	Capital Improvements Program
Consultant Team	Weiss Associates & ENTRIX, Inc.
EDB	Engineering Design Bureau
EIR	Environmental Impact Report
ft	ft
ft/sec or fps	ft per second
MEA	Major Environmental Analysis Division. CCSF Planning
IS	Initial Study
msl	mean sea level (USGS datum)
NGVD29	National Geodedic Vertical Datum 1929
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation
PMB	Project Management Bureau
SFPUC	San Francisco Public Utilities Commission
USACE	U.S. Army Corps of Engineers
USGS	United States Geologic Survey
Weiss	Weiss Associates

COLOR GRAPHICS WITHIN REPORT

Many of the graphics within this report are best viewed in color. Also, an electronic copy has been prepared to enable zooming in on detail features that are not readable in the 8 1/2 x 11 inch format. Should the reader need to view drawing details or observe color graphics, please contact the SFPUC Project Manager to gain access to an electronic copy of this report.

SUMMARY

"Remove barriers to fish passage in keeping with the Alameda Creek Fisheries Restoration Workgroup goal of restoring a self-sustaining population of steelhead to the Alameda Creek watershed, while recognizing other beneficial use (e.g., water supply and flood control)." San Francisco Public Utilities Commission, Sunol/Niles Dam Removal Initial Study Project Objective, July 9, 2004.

Background

The San Francisco Public Utilities Commission (SFPUC) proposes to remove Sunol Dam and Niles Dam on Alameda Creek (the Project) in order to improve fish passage and to reduce public safety concerns at both dam sites. The Project must meet these objectives in an environmentally sensitive manner, addressing potential impacts to aquatic and riparian species associated with dam removal activities, and any subsequent changes to the fluvial processes on Alameda Creek. A Channel Geomorphology Study (Study) was conducted as presented in this Study Report (Report) that addresses geomorphology and fish passage issues associated with this Project.

The SFPUC prepared a Final Conceptual Engineering Report (CER) (Geomatrix, 2004) which recommends partial removal of both dams. The exact dam removal extent and sequence is detailed within the CER. The CER recommended that additional design-level studies be conducted to evaluate concerns raised by resource agencies (e.g., channel stability at Sunol, sediment budget for Alameda Creek). This Study is in support of the studies recommended within the CER regarding geomorphology aspects along the involved reach of Alameda Creek and fish passage issues at the two dam sites.

NOAA Fisheries (NOAA) provided a letter (March 16, 2004) to SFPUC on the Draft CER and requested a written SFPUC response regarding NOAA comments within the letter (NOAA, 2004). This Study and Report are intended provide a response to the NOAA letter.

Purpose

The Study Purpose is to evaluate the potential for adverse impacts related to channel geomorphology (channel dimensions, planform, and sediment transport) and fish passage after partial removal of Sunol and Niles Dam, as presented in the June 2004 Conceptual Engineering Report (CER).

Sediment Volume and Particle Sizes Stored at Niles and Sunol Dams

Sediment volume and particle size data at the Niles and Sunol dam sites were re-evaluated based on previous studies and results presented in the CER (Geomatrix, 2000) and by Trihey & Associates (2000).

Conclusions previously presented in the CER and Trihey & Associates reports regarding particle size at the two dam sites have not changed based on the present Study. At Sunol dam the particle size composition is approximately 1/4 to 1/3 sand ($\leq$ 2mm) and 2/3 to 3/4 gravel. At Niles dam the particle size composition is approximately 1/4 sand and 3/4 gravel. The median particle size (D_{50}) at both dam sites is very fine gravels, from 3mm-15mm (b-axis diameter). The particle sizes stored at the Sunol and Niles dam sites are similar, though slightly finer than that found within the channel downstream from Sunol dam, as measured by pebble counts. Previous conclusions from hydraulic modeling (Trihey & Associates, 2000) indicated that in normal and above normal water years, the sediments stored at both dam sites would be mobilized and transported downstream. Since the particle size data has not changed, this conclusion is not altered by the present Study.

The revised estimate of sediment volume stored at Sunol dam is 37,000 yds^3 which exceeds the higher of the range estimated by the CER (9,000 yds^3 to 15,000 yds^3). Cross-section data from 1912 at Sunol dam provided the foundation for the CER estimate, and was examined for this Study. The CER assumed that several of the 1912 cross-sections represented the original elevation of the bed upstream from the dam site through the reservoir. The interpretation for this Study is that these 1912 cross-sections represented not the original bed of the Alameda Creek channel, but a considerable amount of sediment deposition above the original bed elevation. Between construction of the dam in 1900 and 1912 there was one 10-year and two 5-year storm events. Calculations for this Study indicate that a large volume of sediment would have been transported into the reservoir during this time period. As a result, the assumption that the 1912 cross-sections represent the original elevation of the bed appears highly unlikely.

Some uncertainty remains as to the sediment volume stored at the Sunol dam site. Relatively small adjustments in the estimated bed slope up-and-downstream from the dam, and the extent of backwater deposition caused by the dam, alters the sediment volume estimate. This Study and the CER do concur on the approximate gradient of the original bed through the dam site and reservoir. Additional field surveys of the bed topography upstream from the dam could support, or cause an adjustment, to the overall channel gradient, resulting in a revised sediment volume calculation. Although additional topographic field surveys could improve on the estimated volume, it would not eliminate uncertainty. Local changes in the historic, pre-dam bed topography through the length of the reservoir would not be detected by a topographic survey, but such localized gradient changes can influence the stored sediment volume. Regardless of these uncertainties, the amount of sediment stored at the Sunol dam site does not alter conclusions regarding the relative capacity of Alameda Creek to transport the sediment load stored at the dams (see discussion below).

The Niles reservoir is estimated to store 2,200 yds^3 of sediment. This is within the higher part of the range previously estimated in the CER (700 yds^3 to 2,800 yds^3). The total combined sediment stored at the two dam sites estimated in the present Study is 39,200 yds^3 (67,000 tons).

The total volume of sediment stored at the Niles and Sunol reservoirs represents a relatively small amount of sediment compared to the annual sediment load transported by Alameda Creek. The calculated average annual sediment load for Alameda Creek is 270,000 tons/yr (160,000 yds^3/yr) which represents 4 times the amount of sediment stored at the dam sites. To provide another context, a 3.5-year storm event (7,000 cfs) is capable of transporting an amount of sediment which is nearly equivalent to that stored in the two reservoirs.

Sediment Routing Associated with a Release from Niles and Sunol Dams

Allowing sediments stored behind both dams to naturally erode and transport downstream is a feasible alternative to excavating and end-hauling sediments, which was the recommended option in the CER. The influence of a sediment release at either dam site on channel morphology and aquatic habitat is not likely to be significant, and will most likely cause the type of adjustments that are within the range of natural variability experienced by Alameda Creek. Sediments released from the dam sites will be dispersed over a period of several decades to the downstream reaches. The dominant response of the channel is anticipated to be an enlargement of existing sediment storage features such as bars and natural river levees, and some deposition on the floodplain where the channel is relatively less entrenched. These sediment storage features will moderate the sediment pulse released from the dams. There may be localized aggradation and in-filling of pools in some channel reaches, but this would not be a long-term, persistent condition. These conclusions are supported by the following evidence:

(1) The amount of sediment stored behind the dams is relatively small compared to the sediment load transported by Alameda Creek

(2) There are natural sediment storage features that will moderate the pulse of sediment as it travels downstream

(3) The sediment pulse will be eliminated in a dispersional, rather than a translational mode, reducing the likelihood of significant aggradation in any one river reach

The exact fate of sediments once they reach the ACFCWCD flood control channel is not easily predicted. A model for sediment transport through the flood control channel does not currently exist. Sections of the flood control channel are subject to sediment deposition, requiring excavation to maintain flood capacity. Since the flood control channel was initially constructed in 1965 (some parts were not constructed until 1975) to 1999, approximately 863,000 yds^3 of sediment was excavated to maintain flood capacity. The current ACFCWCD maintenance program removes approximately 300,000 yds^3 of sediment every 10 years.

There are few, if any, long-term sediment storage sites downstream from Sunol Dam. Hydraulic modeling performed at two representative sites indicate that even on those channel reaches with a relatively wide floodplain, a 10-year flow event will be capable of transporting the range of sediment sizes stored at the two dams. Over time, probably a period of several decades, nearly all 39,200 yds^3 of sediments, if released by natural erosion from both the Niles and Sunol dam sites, will reach the flood control channel. A portion of those sediments will potentially deposit in locations where they may need to be excavated. This Study calculated that approximately 7,600,000 tons (4,500,000 yds^3) of sediment load was transported by Alameda Creek (past the Niles gaging station, located one-half mile upstream of the flood control channel) from 1965 to 1999. ACFCWCD has removed through their maintenance activities about 19% of the total Alameda Creek sediment load during this time period[1]. Presumably the other 81% of the natural sediment load either deposits in sections of the flood control channel where it does not present a maintenance concern, and/or the sediment is eventually transported through the flood control channel to the bay.

[1] Data subject to slight revision based upon the actual start-up date (possibly as late as 1975) of the flood control channel.

Fish Passage and Channel Morphology

Criteria for restoring a natural channel morphology and for providing fish passage at the Niles and Sunol dam sites are established in this report, including:

(1) restoring the channel bankfull width

(2) restoring the floodprone width, allowing only minor encroachment

(3) restoring the historic, pre-dam bed elevation

(4) velocities through the restored dam sites should not exceed the range of 6 ft/sec to 8 ft/sec, (or the natural velocity, if this is greater) for flows up to a 2.0-yr discharge

Criteria 1, 2, and 3 are based on geomorphic principles that govern the dimensions and distribution of energy in the channel. The intent is to use these criteria as guidelines for removing dam infrastructure so that Alameda Creek will naturally restore itself to the appropriate channel dimensions, planform, and pattern, and to minimize the risk of inadvertently causing a fish passage barrier in the future. Criteria 3 and 4 are related to restoring the channel to provide fish passage (criteria 3 is related to both restoring a natural channel morphology and to provide fish passage). The velocity criteria for fish passage is derived from the fisheries engineering literature. The dam removal alternatives described in the CER are compared to these criteria. Neither the Sunol nor the Niles dam removal plan described in the CER meet the criteria established in this Study for restoring fish passage or for restoring a natural channel morphology. The results for each dam are discussed below.

Sunol Dam

The bed elevation was evaluated using historic cross-section surveys from 1912, and more recent topographic data collected from 2000, and 2004. These data were compared to assess the bed slope from the bedrock outcrop 1,000 ft downstream of Sunol dam, through the dam site, and upstream to the limit of the impoundment. Based on these data, the uniform bed slope from the bedrock up to the dam is 0.0013. This yielded a natural bed elevation at the dam of 194.4 (USGS datum). This elevation is 1.1 ft higher than the Trihey & Associates (2000) estimate (193.3) and 3.4 ft lower than the Geomatrix (2004) estimate of 197.8. Therefore, it is recommended that the estimated historic bed elevation of 194.4 (all vertical datum in report as NGVD29/USGS/msl unless otherwise noted) be used as the design benchmark for dam removal purposes. This is nearly identical to the elevation estimated in the CER for the invert of the low-flow channel (194.0). It is expected that the channel through the reservoir area will return to a pre-dam gradient of approximately 0.004 ft/ft.

The historic bed elevation of 194.4 should be applied to the entire length of the dam crest, which will in effect eliminate the low-flow notch design proposed in the CER alternative. It will also lower the rest of the dam crest an additional 3 ft from the crest elevation proposed in the CER. This will ensure that the dam crest will not be above the historic bed elevation, will mimize the risk of impeding fish passage, and will allow the channel to naturally position its thalweg. Lowering the rest

of the dam crest will not alter surrounding groundwater elevations any further than proposed by the CER alternative, since it is the lowest elevation point in the channel (e.g., bottom of the low-flow notch) that determines the maximum groundwater elevation behind the dam.

An adverse slope across the dam width, from downstream to upstream, should be cut across the top of the dam to alter it from a broad-crested weir to a sharp-crested weir. This should be incorporated as a design element of the dam removal plan. The purpose of converting the dam to a sharp-crested weir is to reduce the risk that, should the dam crest be exposed after removal, it will act as a fish barrier. This design approach was discussed and recommended by the attendees at the August 19, 2004 Agency/SFPUC meeting.

The Consultant Team further recommends an adaptive management approach that includes annual monitoring at the dam site following removal to ensure that the dam and channel response to crest lowering does not pose an unforeseen fish passage problem. The monitoring should extend over the time period needed to transport all of the sediments stored behind the dam. Should the dam crest become exposed in a manner that creates a fish passage problem, then mitigation actions should be designed and implemented at that time. Adaptive management actions are best undertaken after the channel has had some time to respond to the dam removal. Depending on the nature of any fish passage problems that might arise, a treatment can be designed to address the problem.

There is uncertainty at this time regarding either the likelihood or extent of potential channel incision below the historic pre-dam bed elevation as a result of watershed changes both in the past and ongoing today. It is anticipated that both the lowered dam crest itself, and bedrock that outcrops 1,000 ft downstream from the dam, will provide a control on bed elevations in the reach immediately downstream from Sunol dam. These two control points should provide a moderating influence on potential channel incision following dam removal. Upstream from Sunol dam there are no visible bedrock outcrops, and it is not known if any bedrock outcrops are within the reservoir backwater area itself. If there is channel down-cutting below the pre-dam channel elevation, this would have the effect of flattening the channel gradient to less than .004 ft/ft through the reservoir backwater zone. In fact, the channel gradient would have to decrease by almost one-half, to .002 ft/ft, in order to extend far enough upstream to incise the bed below the present thalweg elevation at the confluence with Arroyo de la Laguna (an unlikely scenario).

Based on the criteria presented above, and the design presented in the CER, an additional 16.5 ft of the left abutment should be removed in order to provide an appropriate floodprone width through the dam site. This will leave only a minimal amount of abutment against the left and right banks. SFPUC has advised the Consultant Team that there may be a practical limit to the extent of abutment removal due to geotechnical and stability issues that were outside the scope of this Study and that will be addressed by SFPUC, as may be required, during final design.

Since all of the natural bankfull width, nearly all of the floodprone width, and the natural bed elevation will be restored, Alameda Creek will be able to restore its pre-dam channel morphology, and eliminate any barriers to fish passage.

The Sunol CER Dam Removal Alternative does not meet two key geomorphology and fish passage criteria (floodprone width and historic stream bed elevation) established within this Study. A Sunol dam removal alternative (Study Alternative) has been provided within this Study that meets all key criteria. However, other acceptable alternatives could likely be developed during final design

that also meet the established criteria. While there are competing issues that will likely influence the Sunol dam removal alternative that is selected during the EIR process; it is nevertheless recommended that the selected alternative meet the criteria established within this Study, especially in regards to fish passage which is one of the SFPUC stated Project objectives.

Niles Dam

The proposed CER dam removal alternative does not provide for restoring either the bankfull width, floodprone width, or the historic bed elevation of the channel. An additional 66 ft of abutment should be removed in order to accommodate the bankfull and floodprone width, and to thereby allow Alameda Creek to restore a natural channel morphology and reduce the risk of creating a fish passage barrier. SFPUC has advised the Consultant Team that there may be a practical limit to the extent of right abutment (adjacent to Niles Canyon Road) removal due to geotechnical and stability issues that were outside the scope of this Study and that will be addressed by SFPUC, as may be required, during final design.

Velocities through the notch in the dam, as proposed in the CER, were simulated for a 1.25, 1.5, and 2.0-yr flow event. The CER alternative is a velocity barrier for discharges associated with the 2.0-year flow event, and is only marginally passable during the 1.5-year and 1.25-year flow events. Widening the dam opening by 66 ft will restore the bankfull channel width, and will achieve the velocity criteria for fish passage.

Niles dam should be lowered to elevation 108.4, which is the estimated historic pre-dam bed elevation and is 6.9 ft below the present dam crest. The entire height of the dam, from crest to foundation, should be removed. This will avoid leaving a potentially unstable section of the dam below grade that could later be dislodged by high flows. Since the actual height of the dam is not known, and may be greater than 6.9 ft, the limits of the dam lowering should be set through pre-demolition surveys of the dam and channel. Drilled core samples through the dam at several locations will indicate the height of the dam above the native bed materials. These data should be used in the bid specifications to indicate the final extent of excavation so that the entire dam height is removed. The CER alternative suggests that the dam will be lowered approximately 5 ft, but no specific design elevation is cited. Lowering the dam crest to the 108.4 elevation will return the channel to its original (pre-dam) elevation and grade, and to the native streambed material. Since there should be no dam crest remaining, there is no potential for a barrier to fish passage associated with crest exposure.

The Niles CER Dam Removal Alternative does not meet any key geomorphology and fish passage criteria (bankfull width, floodprone width, historic stream bed elevation, and passage velocity) established within this Study. A Niles dam removal alternative (Study Alternative) has been provided within this Study that meets all key criteria. However, other acceptable alternatives could likely be developed during final design that also meet the established criteria. While there are competing issues that will likely influence the Niles dam removal alternative that is selected during the EIR process; it is nevertheless recommended that the selected alternative meet the criteria established within this Study, especially in regards to fish passage which is one of the SFPUC stated Project objectives.

Closing

This Summary highlights this Study Report; it should not be treated as a stand-alone document. The reader is referred to the detailed remainder of this Study Report for additional data and for support of the data in this Summary.

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1. INTRODUCTION

1.1 Background

The San Francisco Public Utilities Commission (SFPUC) proposes to remove Sunol Dam and Niles Dam on Alameda Creek (the Project) in order to improve fish passage and to reduce public safety concerns at both dam sites. The Project must meet these objectives in an environmentally sensitive manner, addressing potential impacts to aquatic and riparian species associated with dam removal activities, and any subsequent changes to the fluvial processes on Alameda Creek. A Channel Geomorphology Study (Study) was conducted as presented in this Study Report (Report) that addresses geomorphology and fish passage issues associated with this Project.

On July 9, 2004, City and County of San Francisco (CCSF), Planning Department, Major Environmental Analysis Division (MEA), Lead Agency, issued a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), along with an Initial Study (IS) (SFPUC, 2004). The NOP/IS presents an excellent background on the many varied aspects associated with this Project.

The SFPUC prepared a Final Conceptual Engineering Report (CER) (Geomatrix, 2004) which recommends partial removal of both dams. The exact dam removal extent and sequence is detailed within the CER. The CER recommended that additional design-level studies be conducted to evaluate concerns raised by resource agencies (e.g., channel stability at Sunol, sediment budget for Alameda Creek). This Study is in support of the studies recommended within the CER regarding geomorphology aspects along the involved reach of Alameda Creek and fish passage issues at the two dam sites.

NOAA Fisheries (NOAA) provided a letter (March 16, 2004) to SFPUC on the CER and requested a written SFPUC response regarding NOAA comments within the letter (NOAA, 2004). This Study and Report are intended provide a response to the NOAA letter including the following key comments as extracted (as quotes) from the letter:

1) Sunol Dam - *...The removal design should be sufficient to allow for initial and long-term dynamics to occur without interaction with the remaining dam structure. The extent of dam removal should provide for meandering of the low flow channel and avoid the re-exposure of any of the remaining foundation of Sunol Dam over the long term. .....*

2) Sunol Dam - *...it is recommended by NOAA Fisheries that the extent of sediment removal be limited to the smallest amount necessary for removal of the Sunol Dam crest and foundation while providing for initial and long-term natural channel geometry. .....*

3) Niles Dam - *....NOAA Fisheries recommends the left abutment be removed because this structure may continue to influence the stream channel during large channel forming flow events (i.e. mean annual flood events and above).*

Upon review of the NOAA letter, SFPUC realized that further Study would be necessary to fully address the NOAA comments. SFPUC contracted with Weiss Associates (Weiss) to conduct a Study to assist SFPUC in addressing the NOAA comments. Weiss in concert with ENTRIX, Inc. (the Consultant Team), prepared a Work Plan (Weiss, 2004a) under which this Study was conducted. The Work Plan was initially presented as a draft (Weiss, 2004b), discussed with the Agencies (Weiss, 2004c), revised (Weiss, 2004), and issued as final (Weiss, 2004a).

SFPUC conducted this Study to address NOAA's concerns and to determine the following:

(1) validate abutment removal and the depth of dam removal at Sunol Dam;

(2) address impacts of leaving the left abutment at Niles Dam;

(3) evaluate impacts on channel geomorphology associated with re-exposure of foundation at Sunol or undercutting of abutment at Niles using hydraulic modeling; and

(4) determine the potential fate of sediments impounded by the two structures, and possible downstream impacts associated with allowing the sediments to erode naturally.

1.2 Study Purpose

The Study Purpose is to evaluate the potential for adverse impacts related to channel geomorphology (channel dimensions, planform, and sediment transport) and fish passage after partial removal of Sunol and Niles Dam, as presented in the June 2004 Conceptual Engineering Report (CER).

1.3 Study Team

The following organizations were involved, in varying degree, in this Study prior to the issuance of the Final Study Report:

City and County of San Francisco

- Planning Bureau
- City Attorney's Office
- SFPUC

Consultant Team

- Weiss Associates
- ENTRIX

Consultants

- ESA
- Geomatrix/HDR

Agencies

- NOAA Fisheries
- California Department of Fish and Game (CDFG)
- Alameda County Flood Control and Water Conservation District (ACFCWCD, including Watershed Sciences)
- Regional Water Quality Control Board (RWQCB)
- US Army Corps of Engineers (USACE)

More detail on Study Team composition and roles is provided in Appendix A.

1.4 Scope of Services

Dam Removal

The Study scope covers the following issues pertaining to dam removal issues:

- Identify possible issues related to channel geomorphology and stability that would be created by the proposed project design.
- Conduct hydraulic modeling (using HEC-RAS, etc.) or other methods to evaluate the current project design, and determine if the design would lead to negative impacts on the channel geomorphology, such as significant scouring, bank erosion, reduction in natural lateral migration patterns of the channel, or undercutting of remaining structures.
- Provide conclusions and/or recommendations on the current design or identify other suitable alternatives that will allow an action to be taken to move forward with detailed design and preparation of contract plans and specifications.

Sediment Transport and Deposition

The Study scope covers the following issues pertaining to sediment transport and deposition:

- Conduct hydraulic modeling or other analysis to confirm the disposition of sediments left in place behind both Sunol and Niles Dam
- Provide an indication of the level of risk associated with the potential for increased flooding and bank erosion by allowing sediments to naturally erode.

Task Descriptions

To accomplish this Study, the following tasks were conducted, as detailed within the Work Plan (Weiss, 2004a):

Task 1.0	Develop Work Plan, Initial Agency Meeting and Data Review
Task 2.0	Assess Suitability of Sediment Volumes and Particle Size Data
Task 3.0	Research and Collect Sediment Supply and Sediment Transport Data
Task 4.0	Conduct Field Inspection of Channel Geomorphic Conditions
Task 5.0	Initiation of Motion Analysis
Task 6.0	Estimate Sediment Transport Rates
Task 7.0	Report

On August 19, 2004, a Study Progress Meeting at the completion of Task 5 was held with the Agencies to present interim Study findings and secure mid-Study Agency input (Weiss, 2004d). The Draft Study Report (Weiss, 2004e), dated September 22, 2004, was issued to the Agencies for review and comment. A meeting was held among the Agencies and SFPUC to discuss the Draft Study Report on September 30, 2004. Minutes of the September 30, 2004, meeting were issued (Weiss 2004f). Agency comments were received and included in a Response to Comments document (Weiss, 2004g), with applicable comments incorporated within this Final Study Report, dated October 12, 2004.

1.5 Study Area Description

The Study area covered within this Report encompasses Alameda Creek channel from the confluence of Alameda Creek and Arroyo de la Laguna to the San Francisco Bay, including Sunol and Niles Dams. A detailed description of the history of each dam is presented within the JRP Historical Consulting Services report entitled Historic Resources Report, Sunol and Niles Dams (JRP, 2003). The engineering features and proposed removal of each dam is presented within the Geomatrix report entitled Conceptual Engineering for Removal of Sunol and Niles Dams (Geomatrix, 2004). Historical and engineering details contained within the foregoing reports are not repeated within this Study Report.

Table 1 presents figures prepared using historical data that provide valuable background information important to this Study. The figures referenced within this Study Report are contained within a section towards end of this Study Report entitled Figures.

Table 1. Listing of Study Report Background Figures

Figure No.	Title	Description
Alameda Creek		
1	Map of Alameda Creek Watershed	Presents the Study area in relation to the Alameda Creek Watershed.
2	Alameda Creek – Sunol to Niles	Shows the Alameda Creek Channel Study Area from the

Figure No.	Title	Description
		confluence of Alameda Creek and Arroyo de la Laguna to the town of Niles at Mission Boulevard including key features and Study area stations as referenced within the Study Report.
3	Alameda Creek – Longitudinal Profile	Details the longitudinal profile of Alameda Creek from the confluence of Alameda Creek and Arroyo de la Laguna to the San Francisco Bay.
Sunol Dam		
4	Sunol Dam – Plan and Section View Drawing (1910)	Historical drawing from 1910 that details Sunol dam construction in plan and profile as it currently approximately exists today.
5	Sunol Dam Site (existing) Aerial/Topo View – 1"= 150' Scale	Sunol Dam plan view (1910) superimposed upon an aerial photograph and topographic survey (2003) of the Sunol Dam area at a scale of 1 inch equals 150 ft.
6	Sunol Dam Site (existing) – Existing Aerial/Topo View, 1"= 50' Scale	Sunol Dam plan view (1910) superimposed upon an aerial photograph and topographic survey (2003) at a scale of 1 inch equals 50 ft.
7	Sunol Dam Removal – Plan/Elevation (CER Alternative)	Plan and elevation drawing of the removal of Sunol Dam as presented within the Conceptual Engineering Report (designated as CER Removal Alternative within this Study Report) dated June 2004.
Niles Dam		
8	Niles Dam – Plan and Section View Drawing (1914)	Historical drawing from 1914 that details Niles dam construction in plan and profile as it approximately exists today.
9	Niles Dam Site (existing)Aerial/Topo View – 1"= 40' Scale	Niles Dam plan view (1914) superimposed upon an aerial photograph and topographic survey (2003) of the Niles Dam area at a scale of 1 inch equals 40 ft.
10	Niles Dam Removal – Plan/Elevation (CER Alternative)	Plan and elevation drawing of the removal of Niles Dam as presented within the Conceptual Engineering Report (designated as CER Removal Alternative within this Study Report) dated June 2004.

1.6 Dam Description and Proposed Removal

This section has been taken directly, for the most part, from the Project Initial Study (SFPUC, 2004a).

1.6.1 Sunol Dam Description

In 1900, the Spring Valley Water Company built Sunol Dam, a gravity concrete dam, to provide water to San Francisco. Sunol Dam was constructed in part to "hold back" groundwater in the upstream gravel deposits that occupy Sunol Valley. The Sunol filter galleries were built upstream around the same time as Sunol Dam to drain the water from the gravels and into the Sunol

Aqueduct. Sunol Dam is located in the Niles Canyon reach of Alameda Creek at river mile 16.2 (see Figure 2). Highway 84 (Niles Canyon Road) parallels the creek through Niles Canyon, and lies to the north of the dam.

According to the U.S. Geological Survey (USGS) Niles 7.5 minute topographic quadrangle, Sunol Dam lies at an elevation of about 220 ft. The Union Pacific Railroad (UPRR, formerly owned by the Western Pacific Railroad) and the Niles Canyon Railroad (NCRR, formerly owned by the Southern Pacific Railroad), which generally run parallel to Alameda Creek in Niles Canyon, lie about 100 and 300 ft to the north, respectively, on either side of Highway 84. A commercial (garden) nursery occupies the low-lying, flat area along the north side of the dam and its upstream reservoir.

An available construction drawing of the dam indicates it has a main crest length of 135 ft, a crest width of eight ft, a base width of 14 ft, and a foundation to crest height of about 28 ft (see Figure 4). It also shows the dam is founded on bedrock. The drawing shows the Sunol Aqueduct entering a forebay on the right abutment and flowing along the dam in a concrete conduit, just beneath and parallel to its crest. The aqueduct is connected upstream to the Sunol Water Temple. A fish ladder was originally constructed near the north abutment; however, currently only vestiges of it remain. The current height from the dam crest to the downstream channel bottom in the plunge pool is estimated to be up to about 15 ft (Trihey & Associates, 2000).

Because of the dam's association with the upstream Sunol infiltration galleries, it meets the Secretary of Interior's criteria A, B, and C for listing in the National Register of Historic Places (JRP, 2000). The aqueduct is also considered eligible for the National Register of Historic Places.

1.6.2 Sunol Dam Proposed Removal – CER Alternative

The original dam was built in conjunction with the Sunol infiltration galleries and, based on the construction drawings, it is likely that the original dam is founded on rock that is significantly deeper than the original creek channel. To achieve the project objectives, the following work would need to be performed:

- Remove approximately the top eight ft of the crest of the dam and notch a localized zone down an additional three ft to ensure that a permanent low-flow channel or thalweg is preserved. It is intended that the removal extend down a couple of ft below what was the natural streambed channel before the original construction of the dam. Using this approach, the sediments would cover the remaining section of the dam so that only portions of both abutments and retaining walls would remain visible.
- The historical drawings used to establish the estimated volume of sediments to be removed (see above) indicate that the pre-dam thalweg was approximately eight ft below the present crest of the dam. To ensure that the project objectives would be achieved over the long-term, removing an additional three ft across the crest, for the low-flow channel, or thalweg, would be conservative. However, removing this additional amount of concrete may reduce the groundwater level in the upstream gravel bed by a comparable amount.

- Remove the left (looking downstream) wing-wall down to the dam's crest and remove portions of the left abutment that do not provide any buttressing to the existing hillside and in a manner that would eliminate any elevated terraces or platforms that may attract people to climb or use.
- Remove portions of the header box and wing-walls on the right (looking downstream) abutment. Where the aqueduct conduit would now be visible, install either steel grating or a flap gate to prevent unauthorized access into the aqueduct while allowing it to drain.
- The plunge pool that has been created immediately downstream of the dam during periods of high creek flow would be filled with sediment. Material either upstream or downstream of the dam would be used.

Figure 7 shows the final plan and cross-section for Sunol Dam, after removal, as proposed within the CER.

1.6.3 Niles Dam Description

Niles Dam is located on Alameda Creek at river mile 12.8, near the downstream end of Niles Canyon (see Figure 2). Highway 84 lies directly adjacent to the dam site. Niles Dam reportedly was constructed in 1887 by Spring Valley Water Company (the predecessor to the San Francisco Public Utilities Commission) atop a stone dam originally built in 1841 by Jose de Jesus Vallejo, the brother of General Vallejo, who constructed the original Niles Dam to provide water for a flour mill. The original stone dam probably was founded on bedrock; however, there are no data available to confirm this. The current dam is composed of the original rock-fill base that was capped with concrete.

According to the USGS Niles 7.5 minute topographic quadrangle, Niles Dam lies at an approximate elevation of 120 ft above sea level. The NCRR lies about 150 ft southeast of Niles Dam, on the slopes directly above the creek. The UPRR lies about 2,000 ft south of Niles Dam.

An available construction drawing of the dam indicates it has a crest length of about 120 ft, a width of about eight ft, and a maximum foundation to crest height of about eight ft (see Figure 8). This drawing indicates the main crest was constructed in 1908. The drawing indicates the bottom of the Alameda Creek channel was about six and one-half ft below the north crest of the dam. The north crest is about one foot higher than the main crest, whereas the south crest is about one and one-half ft higher. A fish ladder, which is apparently non-functional, exists near the middle of the dam. The drawing also shows a conduit extending from the upstream side of the right abutment (looking downstream) to a gate house tower on the downstream north bank of the creek, but these structures no longer exist (they may have been removed for construction related to Highway 84). Based on field observations for the conceptual engineering report, the height from the dam crest to channel bottom on the downstream side is probably only about six to eight ft.

Because the dam's original construction is associated with activities related to Mission San Jose, it meets the Secretary of Interior's criteria A and B, for listing in the National Register of Historic Places (JRP, 2000).

1.6.4 Niles Dam Proposed Removal - CER Alternative

To achieve the project objectives, only the middle segment of the dam and the non-functioning fish ladder need to be removed. This section would be removed down to its original foundation as shown on the original drawing. The dam is located in a bend in the creek, so the right abutment (looking downstream) helps to direct the main flows away from the stacked rock retaining wall supporting Niles Canyon Road. If the right abutment were to be removed, then more flow would naturally be directed towards this wall. Scour at the base of the wall could compromise the wall's stability, which would directly affect the ability of Niles Canyon Road to remain open to traffic in both directions. The left abutment is constructed of mortared rock so it may be a part of the original dam construction and is on the inside of the bend in the creek. It does not protrude into the main channel and, therefore, would not be removed. The plunge pool would be filled with sediment taken from either upstream or downstream of the dam.

Leaving the two abutments in place would require some armoring to prevent scour or undercutting of the leading edge. A small portion of the concrete fish ladder that was cast against the original right abutment would be left in place. In addition, cobbles and boulders that are on-site can be used to provide armoring without creating a barrier to fish passage. Figure 10 shows the finished plan and cross-section for Niles Dam, after removal, as presented within the CER.

1.6.5 Activities

During the execution of this Study, the Consultant Team conducted and/or participated in the following significant activities:

- Project Meetings with SFPUC
- Issuance of Draft Work Plan (July 19, 2004)
- Meeting with Agencies to Discuss Draft Work Plan (July 22, 2004)
- Issuance of Final Work Plan (July 23, 2004)
- Field Work and Study Report Development (July/August/September, 2004)
- Progress Meeting with Agencies (August 19, 2004)
- Issuance of August 19 Meeting Minutes (August 30, 2004)
- Issuance of Preliminary Draft Study Report to SFPUC (September 14, 2004)
- Issuance of Draft Report to Agencies (proposed for September 22, 2004)
- Meeting with Agencies to Discuss Draft Study Report (September 30, 2004)
- Issuance of September 30 Meeting Minutes (October 7, 2004)
- Issuance of Response to Comments to Draft Study Report (October 12, 2004)
- Issuance of this Final Study Report (October 12, 2004)

Data sources utilized during the preparation of this Study Report are included within the Reference section (Section 5).

1.7 Report Organization

This Study Report is organized as follows:

Summary: Includes brief summary of Study findings, conclusions, and recommendations. Study Introduction, Purpose, and Site Description.

Section 1: Introduction—Study Introduction, Purpose, and Site Description.

Section 2: Data Analysis—Provides analysis on particle size, impounded sediment volume, sediment routing, channel geomorphology, and fish passage.

Section 3: Findings – Summarizes key findings on particle sizes stored at dam sites, sediment volume stored at dam sites, routing and disposition of sediment, and channel geomorphology and fish passage issues associated with partial dam removal.

Section 4: Conclusion and Recommendations – Lists conclusions and recommendations associated with sediment volume, sediment release and dam component removal.

Section 5: References - Lists key references used to develop Study data and findings.

1.8 Acknowledgements

This Study Report was prepared at the request of the SFPUC Project Management Bureau under the Weiss Associates As-Needed Contract (SFDPW) in cooperation with ENTRIX, Inc., collectively referred to as the Consultant Team within this Study Report. The Consultant Team participants who prepared this Study Report include: Jerry McHugh, PE, Toby Leung of Weiss Associates; Mitchell Katzel, Paul Wisheropp, PE, and Tom Taylor, of ENTRIX. The Consultant Team acknowledges the extensive support and contributions of SFPUC, Agency, and consultant staff who provided data and participated at varying levels during this Study.

Weiss assumes responsibility for the content of this Study Report and listing of individuals and organizations within Appendix A is not intended to represent their respective endorsement of the contents herein. Comments or questions on this Study Report should be directed to Barbara Palacios, PE, (BPalacios@SFWater.org, 415-554-0718), SFPUC Study Project Manager.

2. DATA ANALYSIS

2.1 Particle Size

Existing particle size data at Niles and Sunol dams were reviewed and characterized, with any data limitations identified. No new particle size data were to be collected for this Study. Particle size data were previously collected using bulk sampling methods by Trihey & Associates (2000) at both dam sites and later by Geomatrix (2004) at the Sunol dam site. Samples from both studies were sent to laboratories for particle size analysis.

The importance of the particle size data is that finer particles are more easily mobilized and transported downstream, whereas higher flows are needed to generate the shear stress required to mobilize larger particles. Therefore, it is important to understand the range of particle sizes that could be released from the dam sites since this has potential implications on the frequency with which different particle sizes will be transported and deposited downstream. In addition, researchers have found that introducing a sediment pulse that is either much coarser or much finer than the ambient sediment load will result in differences in the how that sediment pulse is eliminated (dispersion versus translation transport modes, see discussion in section 3.1). Larger particle sizes are carried predominantly as bedload (generally by bouncing or saltating along the bed during high flows), while smaller particles are carried as suspended load, that is they are carried in suspension and are not in contact with the streambed. The transport rate of suspended sediment is almost always greater than that of bedload for a given stream. Grains that are carried in suspended load are generally fine to medium sands (less than 0.5mm), but can include coarser sand sizes, while bedload is generally greater than 1mm in size (Leopold, 1978).

The following particle size grading scale is one often used by geomorphologists and is referred to in this report when discussing particle size classes[1] :

Classification	Particle Size Range (mm)
Boulder	>256-2048
Cobble	>64-256
Gravel	>2-64
Sand	>.062-2
Silt/Clay	<.062

[1] This scale is based on Rosgen, 1996, however other similar scales are used that are based on slightly different classifications and associated particle size ranges.

The Trihey & Associates (2000) particle size data are based on near-surface samples (about 1-ft depth) collected with a shovel. Six samples were collected at Sunol Dam, and 5 were collected at Niles Dam. The sample locations were spread out at random locations along the length of the inundation area behind each dam. The Geomatrix (2004) samples were collected using a vibracore with the recovered samples ranging between 2-4 ft depth. Seven samples were collected at Sunol Dam, none were collected at Niles Dam since it appeared the particle sizes at Niles are very similar to Sunol based on the earlier Trihey data. All of the Geomatrix (2004) samples were collected within approximately 100 ft of Sunol Dam (personal communication, Todd Crampton, Geomatrix).

All of the Trihey & Associates (2000) and three of the Geomatrix (2004) samples were analyzed for particle size. The other four Geomatrix samples were not analyzed because field inspection of the recovered cores indicated that all seven samples were quite similar in size. Data from the analyzed samples were plotted and presented in their respective reports as cumulative particle size distribution curves (the particle size curves are not reprinted here).

The particle size characteristics from each of the analyzed samples collected by Trihey & Associates and by Geomatrix are presented in Table 2 for Sunol Dam and Table 3 for Niles Dam. The D_{50}, D_{84}, and D_{16} represent the particle size for which 50%, 84% and 16% of the samples are finer. Thus, the D_{50} represents the median particle size and is considered a measure of the central tendency of the particle size distribution. The D_{84} and D_{16} represent one standard deviation above and below the median (for a normally distributed curve). The percent of the sample represented by sand size particles and by gravel size particles is shown in the last two columns of the tables.

The data show very similar results between the near-surface and core samples with the D_{50} D_{84} and D_{16} all within similar size ranges (Table 2). D_{50} is from 5-15mm (fine gravels), with most values near 5mm. The D_{84} ranges from 18-25mm (medium gravels) and the D_{16} ranges from 0.7-2.5mm (coarse sand). The percentage sand and gravel composition determined from the near-surface and core samples are also very similar, ranging from 13%-39% sand and from 61%-87% gravel. Overall, the preponderance of data indicate that sand comprises about 1/4 to 1/3 of the particle size composition and gravel comprises about 2/3 to 3/4 at Sunol dam.

There does not appear to be any strong vertical sorting of particle sizes with depth since both the near-surface and core samples show similar particle size composition. However, it is noted that the boring logs provided by Geomatrix do indicate at least a weak trend toward coarsening with depth. The lack of recovery below 4-ft depth from the vibracore samples (this is about ½ the total depth near the dam where the samples were taken) may be due to the presence of coarser materials (cobbles or larger), that are not easily retained in the core sampler (pers comm, Todd Crampton). This could indicate that the overall particle size composition at Sunol dam is slightly coarser than the data show. Nevertheless, this is not a significant limitation since the total depth of the reservoir is not great (maximum of about 8-ft near the dam). Another possible data limitation is the concentration of core samples near the dam; no core samples were taken within the 2,000-foot long sediment deposition area created by the dam's backwater. Although this is a data gap, it is unlikely to be significantly different than the available data. This is because the near-surface samples were collected as far as 1,270 ft upstream from the dam. Given the very similar results between the near-surface and core sample particle sizes that were collected, it is unlikely that there would be significant particle size differences at depth in other parts of the reservoir. Additionally, the thickness of sediment deposition decreases progressing upstream from the dam. Since the relative

depth of sediment is not great, it is unlikely that there would be a strong stratification of particle size with depth and distance from the dam.

Table 2. Particle Size Statistics for Sunol Dam

Sample	Station[a]	D_{84} (mm)	D_{50} (mm)	D_{16} (mm)	% Sand (<2mm)	% Gravel (>2mm)
Near-surface	1250	22	15	1.5	19	81
Near-surface	2420	12	5	.7	39	61
Near-surface	2420	14	5	.7	31	69
Near-surface	2420	12	5	.7	30	70
Near-surface	1270	14	6	1.5	19	81
Near-surface	750	14	5	.9	37	63
Core	≈100	20	5	.9	27	73
Core	≈100	25	7	1.2	26	74
Core	≈100	18	8	2.5	13	87

[a] distance upstream from Sunol Dam, measured only for the near-surface samples. All core samples are within approximately 100 ft from the dam.

Table 3 indicates that Niles dam has very similar particle sizes as Sunol dam. The D_{50} is from 3-8mm (fine gravels). The D_{84} ranges from 10-15mm (medium gravels), with the exception of one sample having a D_{84} of 45mm. The D_{16} ranges from 0.7-1.5mm (coarse sand). The percentage sand and gravel composition are also similar to that at Sunol, ranging from 18%-42% sand and from 58%-82% gravel. Overall, the preponderance of data indicate that sand comprises about 1/4 and gravel comprises about 3/4 of the particle size composition at Niles dam.

Table 3. Particle Size Statistics for Niles Dam

Sample	Station[(a)]	D_{84} (mm)	D_{50} (mm)	D_{16} (mm)	% Sand (<2mm)	% Gravel (>2mm)
Near-surface	400	45	7	1.5	18	82
Near-surface	275	14	6	.9	20	80
Near-surface	[(b)]	15	8	1.5	18	82
Near-surface	[(b)]	14	5	.9	24	76
Near-surface	[(b)]	10	3	.7	42	58

[(a)] distance upstream from Niles Dam
[(b)] exact stationing not known, but within approximately 100 ft of Niles Dam

Since no core samples were taken at Niles dam, there is no information on potential vertical sorting of sediment sizes. However, the maximum depth of sediment at Niles dam is relatively shallow, approximately 5 ft, which is less than that at Sunol dam. Therefore, it is unlikely that significantly different particle sizes would be found at depth. Similarly, the inundation area behind Niles dam extends only about 500 ft upstream, so it is unlikely that there are very different particle sizes with distance from the dam. The near-surface samples do not show evidence of particle-size sorting with distance from the dam (see Table 3).

Trihey & Associates (2000) previously estimated the magnitude of flows needed to mobilize sediments (initiation of motion study) impounded at Niles and Sunol dam sites. Since the particle size data available from the Geomatrix study is very similar to that from the Trihey & Associates study, a revised analysis of flows needed to entrain sediments from the two dam sites is not necessary.

2.2 Impounded Sediment Volume

The total volume of sediment stored behind Niles Dam and Sunol Dam has previously been estimated in two reports. Trihey & Associates (2000) estimated the volume behind each dam based on survey data from upstream, downstream, and within the impoundment. Geomatrix (2004) developed independent estimates of the stored volume using historic survey data of cross sections upstream of Sunol Dam. The estimates differed between the reports. As part of this analysis all of the data submitted in both reports were reviewed and a revised estimate of the stored sediments is provided.

2.2.1 Sunol Dam

Trihey & Associates (2000) Sediment Volume Estimate

Trihey & Associates (2000) surveyed cross sections in the vicinity of Sunol Dam and a longitudinal profile through the dam in July 2000. The cross sections were positioned to include two downstream from the dam, one near the upstream limit of the impoundment, and several in the impoundment area. The surveys began on high ground of the left bank (facing downstream), traversed the channel, and terminated on high ground of the right bank. The longitudinal profile and the cross sections show the ground elevation at the time of the survey (Figure 11).

It was observed during the survey that Sunol Dam not only impounds water but also sediment. Furthermore, the sediment elevation is near the elevation of the top of the dam. That is, the impoundment is nearly filled with sediment. Therefore, the ground elevations in the impoundment surveyed for the longitudinal profile and cross sections reflect the stored sediment elevation and not the original bed elevation. To ascertain the original bed elevation, Trihey & Associates located the upstream extent of the impoundment and estimated the bed slope between this point and the bed elevations downstream of the dam (i.e., downstream of the impounded sediment). The upstream limit of the impoundment was identified by several features including a change in the slope of the water surface, a reduction in the sediment stored in the stream bed, and vegetation

patterns. Trihey & Associates determined that the impoundment extends 2,400 ft upstream from the dam.

The elevation of the upstream limit of the impoundment was then used with the elevations surveyed downstream of the dam (and impoundment) to estimate the natural channel bed slope. This procedure resulted in an assumed natural bed slope of 0.0047 ft/foot. This slope intersected the dam at an elevation of 193.3 (USGS datum), representing the natural bed elevation.

The historic pre-dam cross-section was estimated by taking the July 2000 surveyed cross sections and lowering the bed to a point that lies on the assumed natural bed slope. A comparison of the surveyed cross-section in the impoundment (top of sediment) and the same cross-section modified to extended down to the assumed natural bed resulted in an estimated volume of sediment at a cross-section. The total volume of sediment was estimated by extending the area of sediment over the entire length of the reservoir. This procedure resulted in 42,000 yds^3 of sediment.

Geomatrix (2004) Sediment Volume Estimate

Geomatrix (2004) estimated the volume of sediment stored behind Sunol dam using existing surveys and historic cross sections surveyed in 1912. These historic cross section surveys started from 1,000 ft downstream of the dam and extended 2,000 ft upstream. The historic cross sections were surveyed about 12 years after the dam was constructed.

Geomatrix used the historic cross sections to estimate the natural bed elevation at the dam to be 197.8 (USGS datum). Two other historic bed elevations are listed by Geomatrix (Figure 3-4 of Geomatrix report) in this analysis based on a survey on May 25, 1910 (196.8 ft) and December 1910 (192.8 ft). Geomatrix concluded from the bed elevations in the 1912 survey that the impounded sediment extended about 1,500 ft upstream. A comparison of the 1912 cross sections and the existing ground elevations yielded an estimate of 9,000 yds^3 of stored sediment. Geomatrix also determined that if the top of the dam was used as the current sediment elevation (204.70), the estimated volume of sediment is 15,000 yds^3 and would extend 1,800 ft upstream. This estimate results in a natural bed slope of 0.0042 (7.5 ft/1,800 ft).

Revised Sediment Volume Estimate

Both Geomatrix (2004) and Trihey & Associates (2000) used similar methods to estimate the total volume of sediment present behind Sunol Dam. Both methods arrived at similar natural bed slopes (0.0042 and 0.0047) but through independent means. The difference in the sediment volume estimates is a result of different estimates of the longitudinal extent of the impoundment behind Sunol Dam and the elevation of the natural bed at the dam. The Trihey & Associates (2000) estimate of the natural bed is 3.4 ft lower than the Geomatrix (2003) estimate. In addition, Trihey & Associates estimated the extent of the impoundment to be about 900 ft further upstream.

As a check on the two estimated sediment volumes, this Study conducted additional surveys of the bed elevation downstream from Sunol dam and reviewed the existing data, including the 1912 surveys. The additional surveys for this Study began at a bedrock outcrop about 1,000 ft downstream of the dam and continued upstream to the top of the dam. The 1912 survey also surveyed the bed for a similar distance downstream.

The bed elevation data for 1912, 2000, and 2004 were compared to assess the potential bed slope from the downstream bedrock outcrop, through the dam, and upstream to limit of the impoundment. Based on these data, the uniform bed slope from the bedrock up to the dam is 0.0013. This yielded a natural bed elevation at the dam of 194.4 (USGS datum). This elevation is slightly higher than the Trihey & Associates (2000) estimate (193.3) and lower than the Geomatrix (2004) estimate of 197.8. This elevation was then projected 2,400 ft upstream from the dam to the limit of the impoundment estimated by Trihey & Associates (2000). The resulting bed slope through the reservoir is 0.0044, slightly flatter than the Trihey & Associates (2000) estimate but closer to the Geomatrix slope (Figure 11).

To estimate the total sediment volume, the 1912 cross sections were used with the cross section invert projected onto the revised bed slope. The resultant sediment volume is estimated to be 37,000 yds^3. This revised estimate is 12% less than the original estimate performed by Trihey & Associates in 2000. The difference between this estimate and Geomatrix is the elevation of the natural channel at the dam and the upstream extent of sediment deposition in the reservoir.

2.2.2 Niles Dam

The Trihey & Associates (2000) study estimated the volume of sediment behind Niles Dam to be 2,200 yds^3 using similar procedures as at Sunol Dam. The upstream extent of the impoundment was estimated to be 600 ft. Geomatrix estimated the volume to be 700 yds^3, extending about 500 ft upstream of the dam. Geomatrix also provided a conservative estimate of stored sediment at 2,800 yds^3. Both Trihey & Associates (2000) and Geomatrix (2004) estimated the natural bed slope to be 0.008 ft/ft (Figure 12).

The primary difference between the two estimates is that the natural bed elevation at the dam developed by Trihey & Associates (2000) was based on two surveyed cross sections downstream of the dam, the plunge pool at the dam, and the elevation of the bed at the upstream extent of the impoundment. These points fall on a line with a slope of 0.008, starting at the downstream elevation. The resulting natural bed elevation at the dam is lower than the Geomatrix estimate. In addition, the length of the impoundment is greater in the Trihey & Associates estimate. The difference in natural bed elevation at the dam and the additional 100 ft of impoundment in the Trihey & Associates estimate results in the difference between the two estimates of stored sediment volume. The Geomatrix (2004) conservative estimate is approximately the same as the Trihey & Associates (2000) estimate.

2.3 Sediment Load

The USGS has collected suspended sediment load data, and recently bedload data, at several locations in the Alameda Creek watershed. The most relevant data to the dam removal project is the sediment load measured at the UGSG gaging station 11179000 "near Niles" (hereafter referred to as the Niles gaging station) which is located approximately 0.5 mile upstream from the beginning of the ACFCWCD flood control channel at Niles Junction. Data from this gaging station provides a measure of how much sediment is transported by Alameda Creek to the flood control channel. By comparing the relative amount of sediment stored at Niles and Sunol dams to the amount of sediment

annually transported by Alameda Creek, we can establish a context for gauging potential effects of releasing sediments from the dams. If the total sediment stored behind the dams contributes much larger amounts of sediment than is annually transported by Alameda Creek over several years, then the potential for adverse geomorphic effects (for example aggradation or change in channel type) is relatively greater than if the amount of stored sediments are less than that typically transported in a year.

Total sediment load is comprised of two parts: suspended load and bedload. Suspended sediment load was calculated using the USGS measured data. Bedload was calculated using bedload transport equations, with calibration to the few bedload samples that have been collected by the USGS. The analyses for suspended load and bedload are presented under separate sub-sections below (2.3.2 and 2.3.3). In order to prepare and interpret the results from both of these analyses, it was necessary to analyze streamflow data from the Niles gaging station. The streamflow data are first presented in sub-section 2.3.1.

2.3.1 Peak Flows

A flood frequency analysis was prepared using peak flow data from the Niles gaging station for the period of record 1970-2003. This period of record was used because it reflects more recent land-use and flow conditions in the Alameda Creek watershed (i.e., is post development of San Antonio, del Valle, and Calaveras Reservoirs). Standard USGS guidelines for plotting the flood frequency data were used to prepare the flood frequency curve (US Department of Interior, 1982) which is shown in Figure 13. The data points for the full period of record, 1892-2003 (shown as red x's) are also overlaid on the flood frequency plot. There are only relatively small differences in the annual flood peaks comparing the data from 1970-2003 to the entire period of record 1892-2003. The following selected return intervals are derived from the flood frequency plot and are referred to throughout this report:

1.25 year = 1,560 cfs
1.5 year = 2,000 cfs
2.0 year = 4,200 cfs
5.0 year = 9,700 cfs
10 year = 14,400 cfs
25 year = 21,200 cfs
50 year = 26,700 cfs
100 year = 32,400 cfs

2.3.2 Suspended Sediment Load

The USGS collected suspended sediment data for the Niles gage location and report the results on either an instantaneous flow or average daily flow basis (the instantaneous flow and average daily flow represent different samples). All of the suspended sediment data encompass a period of 12 years. A sediment rating curve is fitted to the USGS data in Figure 14 and Figure 15. The annual suspended sediment load at the Niles gage was calculated using the sediment rating curve in Figure 15. A 23-year period (1981-2003) was used to represent present-day suspended sediment load conditions. This 1981-2003 period encompasses both wet and dry years, with annual peak flows

ranging from an 18-year event to less than a 1.25 year event. The suspended sediment load for each year is plotted in Figure 16.

The mean annual suspended sediment load is 256,000 tons/yr and the median annual is 69,000 tons/yr. The large difference between the mean and median reflects the proportionally larger influence of large flow events on the suspended sediment load. The annual peak flow is also plotted on Figure 16, which shows a close correspondence between the magnitude of the annual peak flow and the suspended sediment load for a given year. The average annual suspended sediment load for Alameda Creek at Niles is approximately 404 tons/mi^2/yr over the 633mi^2 drainage area.

2.3.3 Bedload

Only a few measurements of bedload transport have been made by the USGS, and these are plotted on Figure 14. Since there are insufficient sampling data from which to prepare a bedload transport rating curve, it was necessary to use a bedload transport equation. In order to estimate the total bedload transported by Alameda Creek, we selected two bedload transport equations, Meyer-Peter and Muller (1948), and Wilcock (2001) two-fraction model. Both of these bedload transport functions were selected because they are suitable for coarse-bedded streams such as Alameda Creek. The Meyer-Peter and Muller bedload transport function is based on flume experiments, and has been extensively tested and applied. The Wilcock two-fraction model is based on flume and field transport measurements. The two-fraction model incorporates the nonlinear effects of sand content on gravel transport rates (Wilcock and Kenworthy, 2002), which is pertinent to the particle size composition observed and measured in Alameda Creek for this Study.

The Wilcock formula calculations were performed using an automated spreadsheet, Bedload Assessment in Gravel-bedded Streams (BAGS) developed by the US Forest Service, Stream Systems Technology Center. Inputs to the Wilcock calculation require a cross-section to define the channel geometry, water surface slope, particle size distribution, and Manning's roughness coefficients. A topographic survey was performed at the Niles gaging station to obtain a cross-section and slope, and field observations provided the Manning's roughness coefficients. Particle size data was obtained from pebble counts that were performed for the initiation of motion analysis at the lower hydraulic modeling site (see section 2.4). The pebble count is plotted as a cumulative particle size distribution in Figure 17. Field observations indicate that the particle sizes present at the lower hydraulic modeling site were similar to those observed at the Niles gaging site, so this was a reasonable approach. The calculations were calibrated using the bedload transport measurements available from the USGS.

The Meyer-Peter and Muller (MPM) calculation was performed using the US Corps of Engineers HEC-RAS modeling program (version 3.1.1). The same inputs used for the Wilcock calculation are used in the MPM calculation. Results from both the Wilcock and MPM calculations are plotted in Figure 18. The Wilcock model produces a steeper bedload transport curve than MPM, and is approximately 1.7 times the transport rate at 2,000 cfs and 2.5 times the transport rate at a flow of 10,000 cfs. This is within the range of differences found by other studies comparing various bedload transport formulas to measured transport rates in the field (Stevens, 1989, and Yang, 1991).

For a given discharge, bedload makes up approximately 5%-6% of the suspended load based on the Wilcock model, and 2%-3% based on the MPM model. The model results compare reasonably well with the few bedload samples collected by the USGS (see Figure 14). Bedload usually comprises between 5% to 50% of the total sediment load of a river (Dunne and Leopold, 1978). Thus, the vast majority of the total sediment load in Alameda Creek is transported as suspended load. For purposes of calculating the total sediment load (section 2.3.4), we elected to use the results from the Wilcock model, although in the final analysis there is very little difference regardless if MPM or Wilcock is used since the great majority of the sediment is carried as suspended load.

2.3.4 Total Sediment Load

The average annual total sediment load (suspended + bedload) is 269,000 tons/yr and the median annual sediment load is 72,000 tons/yr. The annual sediment load calculated for the period of record water year 1981-2003 is shown in Figure 19. The average annual sediment load represents 425 tons/mi^2/yr derived from the watershed. To provide some context, this compares with an average sediment load of 1,300 tons/mi^2/yr for California watersheds (with drainage basins less than 100 mi^2) that range from a low of 80 to a high of 5,570 tons/mi^2/yr (Leopold, 1994).

2.4 Sediment Routing

Two studies were performed in order to describe the potential disposition of sediments (i.e., sediment routing) that might be allowed to naturally transport downstream from the dam sites as part of the dam removal plan. One study was to conduct a field examination of Alameda Creek between the flood control channel at Niles Junction upstream to Sunol dam. The objectives of the field observations were to document the morphological characteristics of the channel, particularly focusing on the availability of natural sediment storage sites, and to describe the relative capacity of the channel to transport sediments.

The second, initiation of motion study, focused on determining hydraulic conditions at representative sites that might be most sensitive to potential deposition of sediments. The objective for this second study was to quantitatively assess the magnitude of flows needed to transport sediments from the channel, bars, and floodplain features found between the dam sites and the flood control channel. The initiation of motion study provides insight as to the frequency with which sediments may be deposited or transported from the channel and associated floodplain areas. The study method is based on hydraulic modeling techniques. The field inspection is discussed in section 2.4.1 Channel Geomorphic Characteristics, and the hydraulic modeling analyses are discussed in section 2.4.2 Initiation of Motion.

2.4.1 Channel Geomorphic Characteristics

A field examination of Alameda Creek was conducted during July 2004 by walking the channel study reach from the ACFCWCD flood control channel at Niles Junction (river station 0)

upstream to Sunol Dam, and ending at the confluence of Alameda Creek and Arroyo de la Laguna (river station 29,500), as shown in Figure 2. The objectives of the field examination were to:

- Characterize channel morphology
- Identify and describe the extent of sediment storage sites
- Estimate the amount of sediment stored in bars
- Select locations for the Initiation of Motion Study

During the field survey, locations of floodplains, bars, and other channel features were tracked using a hip-chain and are referenced to the stationing shown in Figure 2 (note that the accuracy of the stationing is considered to be approximately ±500 ft).

Overall, Alameda Creek in the Study reach is predominantly moderately entrenched alternating with some reaches that are well-entrenched. Entrenchment is defined as the degree to which the channel is vertically contained in its valley, and is typically measured as the ratio of the width of the floodprone area to the width of the bankfull channel. The lower the entrenchment ratio the more well contained the channel, and the higher the entrenchment ratio the more moderately or poorly entrenched the channel. High entrenchment ratios range from 1.0-1.4, moderate entrenchment from 1.4-2.2, and slightly entrenched is greater than 2.2 (Rosgen, 1996).

The degree of entrenchment along most of the Study reach is based on visual field observations, except for sites that were selected for hydraulic modeling to assess mobility of bed particles (see section 2.4.2) where measurements were made of the bankfull and floodprone widths.

The most highly entrenched reach observed begins approximately 1 mile downstream from Sunol Dam, and extends from station 21,000 to station 16,500 nearly a mile-long reach of Alameda Creek. A well-to-moderately entrenched reach extends for about 1,000 ft below Sunol Dam (measured entrenchment ratios range from 1.15 to 1.45). Most of the rest of Alameda Creek in the study reach can be described as moderately entrenched, with floodplains adjoining the channel that can be from 20 ft up to 200 ft wide. One of the more moderately entrenched reaches is located approximately 2,000 ft downstream from Sunol Dam, with a measured entrenchment ratio of 1.9 (Photo 1). This reach is approximately ½ mile long and was selected for hydraulic modeling (see section 2.4.2). It can be expected that the more moderately entrenched reaches of Alameda Creek will have a lower sediment transport capacity than the more highly entrenched reaches.

Figure 3 is an elevation profile of Alameda Creek from San Francisco Bay to the confluence with Arroyo de la Laguna. Channel gradients in the study reach range from .013 ft/ft to .0025 ft/ft. For about 3.0 miles downstream from Sunol Dam the channel gradient is approximately .004 ft/ft. From Niles Dam downstream to about the USGS gaging station at Niles the gradient is .002 ft/ft. The lowest gradients are found downstream from the study reach. The flood control channel beginning at Niles Junction to San Francisco Bay has an overall gradient of .001.

In general, the lower gradient channel reaches will have a lower sediment transport capacity than the higher gradient reaches. The stair-stepped portion of the profile up-and downstream from Niles Dam (from about 50,000 to 70,000 ft upstream from San Francisco Bay) indicate nickpoints where the channel has not been able to down-cut in order to achieve a stable concave longprofile form. Such nickpoints are probably associated with resistant bedrock exposures, or other "hard-

points" in the channel, a number of which were observed during the field inspection. A concrete weir spans the channel at the Niles gaging station that is close to the downstream nickpoint (56,500 ft from San Francisco Bay, on Figure 3). There is also an old concrete weir that spans the channel upstream from Niles Dam (near 68,000 ft from San Francisco Bay on Figure 3) that is close to the upstream nickpoint. It is not known if these two constructed weirs or other bedrock outcrops are responsible for the nickpoints on the longitudinal profile. Seven bedrock outcrops were observed between 1,000 ft to 9,000 ft downstream from Sunol Dam, however, there are no apparent nickpoints discernable on the longitudinal profile associated with these locations.

The study reach of Alameda Creek is predominantly defined as a pool-riffle channel type that is characterized by an undulating bed with a laterally oscillatory sequence of bars, pools, and riffles (Montgomery-Buffington, 1997). Bedform patterns and grain roughness are the primary flow-resistance features (i.e., roughness elements). For pool-riffle channel types, sediment storage occurs in the bars and overbank areas. Gradients for the pool-riffle channel type range from .001 ft/ft to .03 ft/ft, with most streams having a gradient between .004 to .01 ft/ft. Pool-riffle channel types exhibit a mixture of both supply and transport-limited characteristics (supply limited is characterized by much greater capacity to carry the sediment load than the available sediment supply, and transport-limited is characterized by a much lower capacity to carry the sediment load than the available supply).

Five types of sediment storage features were observed on Alameda Creek: (1) natural river levees, (2) banks, (3) bars, (4) channel bed, and (5) floodplains. Sediment storage characteristics associated with bars and floodplains were tracked and measured for this Study. Natural river levees, banks, and the channel bed were qualitatively observed, but no measurements were made relative to these features.

Natural river levees are formed by sediment deposition during high flows. These river levees are found discontinuously along the study reach, are predominantly composed of fine-grained material, and build banks bordering the channel that are from 4 ft to 8 ft high. The levees are often well-vegetated, which helps to trap and hold sediments. The extent of sediment storage along the river levees was not estimated. The river levees are probably regularly scoured of their sediments during high flows, which are very likely replenished by new sediments that are deposited during the receding limb of storm events. Streambanks were predominantly composed of sand, and are well vegetated. There was little evidence of streambank erosion in the study reach. It is expected that streambanks will be subject to fine sediment entrainment during high flows, with redeposition on the receding limb of storm events. The channel bed appears to be a significant sediment storage feature in the study reach. Relatively long reaches of the channel (segments >500 ft) were observed to be composed of loose gravel and sand that will be readily mobilized by high flows. Bars and floodplain storage areas are discussed below.

The location, size, sediment volume, and particle size composition of bars were identified along the study reach as shown in Table 4 (a few heavily vegetated bars were difficult to measure and are not included in Table 4). There is an estimated 12,600 cubic yards of sediment stored in the bars located between the flood control channel (station 0) and Sunol Dam. Photo 2 shows a pair of alternate bars upstream from Niles Dam, at station 8822. Upstream from the reservoir created by Sunol Dam there is one bar located at the confluence of Arroyo de la Laguna (see Table 4, station

29000) that contains approximately 2000 yds^3 of sand and gravel. This bar has been observed to be subject to frequent scour and deposition (pers. comm., Tom Taylor, Entrix Inc.).

Table 4. Bar Sediment Storage in Alameda Creek Study Reach

Start Station	Length (ft)	Width (ft)	Height (ft)	Volume (yds^3)	Particle Size [a]	Notes
0						
4683	200	50	2.5	926	c, g ,s	Bars under trestle
7573						Niles Dam
8582	40	12	2	36	G	
8822	200	50	1.5	556	G	Series of alternate bars
8900	90	25	1.5	125	G	Series of alternate bars
9154	71	30	2	158	G	Series of alternate bars
11513	200	50	3	1111	g, s, b	Rt bank
13105	719	20	2.5	1331	g, s	Left bank
13623	80	20	1.5	89	s, g	Right bank
13896	155	20	1.5	172	s, g	Left bank
15000	120	30	1.5	200	s, g	Left bank
18421	198	10	1	73	G	
20144	211	20	2	313	s, g	mid-channel bars
22905	150	15	1.5	125	G	Left bank
23765	490	25	4	1815	s, g	
24173	857	50	3.5	5555	s, g, c	Downstream from Sunol Dam
25055						Sunol Dam
				12,600 yds^3		**TOTAL Downstream from Sunol Dam**
29,000	300	60	3	2000	c, s	Confl w/Arroyo de la Laguna

[a] s = sand, g = gravel, c = cobble, b = boulder

The location and dimension of floodplains identified in the study reach are shown in Table 5. There is over 10,900 linear ft of floodplain (greater than 20 ft in width), adjoining Alameda Creek, representing nearly one-half of the study reach. Most floodplains were at least partially

well-vegetated with brush and trees, and these more well vegetated areas are prone to greater amounts of sediment deposition (Photo 3). The most typical particle sizes observed on the floodplain are sand to fine gravel, but well-to-poorly sorted deposits of larger gravels and cobble were also observed. Debris lines (comprised of woody, vegetative material) that are indicative of recent past high flows were noted in many of the floodplain areas (Photo 4). Evidence of high flow scour channels were also observed, often between the natural river levees and the floodplain.

Table 5. Floodplain Locations, Dimensions, and Particle Size Characteristics

Station start	Station end	Length (ft)	Width (ft)	Particle Size[a]	Description
0					Begin flood control channel
1721	2700	1000	50	s, g, c	Well vegetated, flood debris lines
2700					USGS Niles gaging station
3870	4055	185	100	s, g, b	Rt bank, scattered vegetation
4683	5176	493	30		Well vegetated
5176	5466	290	25	g, s	Well vegetated
7573					Niles Dam
8100	8900	800	25	s	Floodplain switches between rt & lft banks
9000	10700	1700	100	c, s, g	Dense vegetation, floodplain on rt bank
11800	12390	590	>20		Left bank upstr of concrete weir
13105	13824	720	>20		Dense vegetation
14100	15050	950	>200	s, g, c	Channel margin well vegetated, flood debris indicators
15710	16110	400	50	s, g	Perimeter along channel is vegetated
16110	16687	577	25	s, g	Floodplain on left bank, well vegetated
20150	19670	480	>20		Rt bank, well vegetated
22900	20820	2080	>100	s, g	Rt bank, fine sediment storage in vegetated areas, flood debris
23520	22900	620	>20	s, g, b	Channel margin well vegetated
25050					
		10,900 ft			**TOTAL Linear Feet of Floodplain**

[a] s = sand, g = gravel, c = cobble, b = boulder

The amount of sediments stored on the floodplain was not estimated, but it is believed to have the largest sediment storage capacity in the study reach. The channel bed is likely the next largest sediment storage area, probably several times the amount of sediment as is stored in bars. Bars and river levees probably comprise a similar amount of sediment storage. It is not known the extent to which banks function as sediment storage sites, but of the five types of sediment storage features, streambanks and floodplains probably represent the most stable sediment storage sites being subject to scour and entrainment less frequently than the channel bed, bars, or river levees. It should be noted that all of the sediment storage features also represent sources of sediment during high flow scour events.

2.4.2 Initiation of Motion

Two sites were selected following the field examination of the study reach to evaluate the flows required to entrain sediments. The first site, hereafter referred to as the "lower hydraulic modeling site" (Figure 2) is located approximately ½ mile downstream from Sunol Dam. This site is bordered by a wide floodplain area (see Table 5, station 22,900 to 20,820) with a moderate entrenchment ratio, and is representative of other sections of Alameda Creek that adjoin a relatively wide floodplain (Photo 5). This site will more likely be subject to sediment deposition compared with more highly entrenched reaches.

The second site, hereafter referred to as the "upper hydraulic modeling site" (Figure 2) is located just downstream from Sunol Dam. This site has a moderate to high entrenchment ratio, with no floodplains, and several large bars (Photo 6). If it is elected to release sediments from behind Sunol Dam as part of the removal project, then this will be the first site through which the sediments must be transported.

The US Corps of Engineers HEC-RAS modeling was used to determine stage-discharge relationships and velocity at each site. Input to the HEC-RAS model included channel geometry from topographic surveys of cross-sections and water surface slope, and a roughness coefficient (Mannings n) based on field observations. A pebble count was performed at each site to define bed particle size.

The slope, velocity, and particle size data from HEC-RAS output were used to calculate grain shear stress over a range of flows for each cross-section. Grain shear stress (τ') was compared to the critical dimensionless shear stress (t^*ci). When $\tau' > t^*ci$ there is initiation of motion. The following formula was used to calculate grain shear stress (Wilcock, 2001):

$$\tau' = 17(SD_{65})^{.25} U^{1.5}$$

Where:

S = slope
D_{65} = the particle size for which 65% of the bed material is finer
U = velocity

Critical shear stress is determined from Shields' relationship defined as:

$$t^*ci = \beta (\gamma_s - \gamma) d_{50}$$

Where:

β = Shield's parameter (a dimensionless variable)
γ , γ_s = specific weight of the fluid and sediment, respectively
d_{50} = median particle diameter

The appropriate value to use for Shield's parameter (β) is the subject of much debate amongst hydraulic engineers and geomorphologists, with various values derived based on empirical studies that considered different geomorphic conditions. The value 0.04 is a commonly used Shields' parameter in coarse gravel bed streams (Simons, Li & Assoc. 1982) and is used in this assessment for

all cross-sections. Although initiation of motion occurs when critical shear stress is exceeded by actual grain shear stress, the transport rate and distance of transport of the streambed material may be quite small when the critical shear stress is only slightly exceeded. Using Shields' method addresses the conditions to initiate motion, but does not calculate the total volume of streambed particles that could be mobilized.

HEC-RAS was used to simulate hydraulic conditions for the 1.5, 2.0, 5.0 and 10-year flow events. Each site was divided into a channel, left overbank, and right overbank area to define the hydraulic conditions. Results from each site are shown below.

Lower Hydraulic Modeling Site

Four cross-sections were surveyed and used to define the channel geometry. The stage-discharge relationship from the HEC-RAS model is shown for each cross-section over the range of flows modeled in Figure 20. The 2.0-yr event just begins to overflow onto the floodplain, and the 5-yr flow begins to overbank most of the entire width of the floodplain. Table 6 shows expected largest particle size entrained for each cross-section and discharge simulated. The table distinguishes the channel, left, and right overbank areas. The left overbank area at this site is the floodplain (the right overbank is a steep hillslope). Table 7 is a reach-averaged summary of the results from Table 6.

Two pebble counts were conducted; one in the low-flow channel (actively wetted perimeter at the time of the pebble count) and one above the low-flow channel just below the right overbank. The combined pebble count from the two samples define the bankfull area of the channel, and is plotted in Figure 17 as a cumulative particle size distribution curve. The median bed particle size (D_{50}) in the active channel is 39mm and the median bed particle size across the bankfull channel width is 9mm (see Figure 17). No pebble counts were performed on the floodplain, which is dominated by sand and very small gravels.

The results in Table 7 show that less than the 1.5-year flow event will mobilize from the channel all particle sizes stored at Sunol dam site. Although a 2.0-year event would mobilize the median particle size stored at Sunol dam, most of the floodplain will not be inundated. Thus, a 5.0-year flow event is necessary to inundate most of the floodplain, and to mobilize the median particle size stored behind Sunol dam that may be deposited on the floodplain. The 10-year flow event will mobilize all particle sizes stored at the dam.

Table 6. Initiation of Motion Results for Lower Hydraulic Modeling Site

			CHANNEL		LEFT OVERBANK (Hillslope)		RIGHT OVERBANK (Floodplain)	
	RIa	Flow (cfs)	Grain Stress (lbs/ft^2)	Largest Particle Moved (mm)	Grain Stress (lbs/ft^2)	Largest Particle Moved (mm)	Grain Stress (lbs/ft^2)	Largest Particle Moved (mm)
XS1	1.5 yr	2100	0.36	26	0.06	4		
	2 yr	4150	0.60	45	0.09	9	0.02	1
	5 yr	9700	1.13	85	0.13	10	0.07	5
	10 yr	14400	1.19	89	0.15	11	0.13	10
XS2	1.5 yr	2100	0.31	24	0.04	3	0.03	2

			CHANNEL		LEFT OVERBANK (Hillslope)		RIGHT OVERBANK (Floodplain)	
	RIa	Flow (cfs)	Grain Stress (lbs/ft^2)	Largest Particle Moved (mm)	Grain Stress (lbs/ft^2)	Largest Particle Moved (mm)	Grain Stress (lbs/ft^2)	Largest Particle Moved (mm)
	2 yr	4150	0.55	41	0.05	4	0.08	6
	5 yr	9700	1.16	86	0.08	6	0.15	11
	10 yr	14400	1.36	100	0.13	10	0.13	10
XS3	1.5 yr	2100	0.80	60	0.08	6	0.10	8
	2 yr	4150	1.10	80	0.12	10	0.20	15
	5 yr	9700	1.87	138	0.20	15	0.41	30
	10 yr	14400	3.34	210	0.28	21	0.65	48
XS4	1.5 yr	2100	0.83	61	0.07	5	0.07	5
	2 yr	4150	1.13	83	0.08	6	0.17	12
	5 yr	9700	1.67	124	0.23	17	0.23	17
	10 yr	14400	1.94	144	0.31	22	0.35	26

[a] RI = Recurrence Interval

Table 7. Reach Averaged Maximum Particle Size Entrained (mm)

	Channel	Left Overbank	Right Overbank
1.5 yr	43	5	5
2.0 yr	62	7	9
5.0 yr	108	12	16
10.0 yr	136	16	24

Upper Hydraulic Modeling Site

Five cross-sections and a longitudinal profile were surveyed and used to define the channel geometry (Appendix B). The stage-discharge relationship from the HEC-RAS model is shown for each cross-section (additional cross-sections upstream and downstream from the Union Pacific Railroad crossing are generated by HEC-RAS and are also shown) over the range of flows modeled (Figure 21 and Figure 22). The 1.5-yr event just begins to overflow onto the bars. Table 8 shows expected largest particle size entrained for each cross-section and discharge simulated. The table distinguishes the channel, left, and right overbank areas. The left overbank area is defined by a bar deposit and the right overbank area is a steeply sloping hillside. Table 9 is a reach-averaged summary of the results from Table 8.

Table 8. Initiation of Motion Results for Upper Hydraulic Modeling Site

			CHANNEL		LEFT OVERBANK (Bar)		RIGHT OVERBANK(Hillslope)	
	RIa	Flow (cfs)	Grain Stress (lbs/ft2)	Largest Particle Moved (mm)	Grain Stress (lbs/ft2)	Largest Particle Moved (mm)	Grain Stress (lbs/ft2)	Largest Particle Moved (mm)
XS1	1.5 yr	2100	0.53	39	0.16	12	0.12	9
	2 yr	4150	0.43	32	0.17	13	0.12	9
	5 yr	9700	0.46	34	0.24	18	0.14	11
	10 yr	14400	0.50	38	0.27	20	0.17	13
XS2	1.5 yr	2100	0.51	38	0.08	6	0.04	3
	2 yr	4150	0.55	41	0.17	13	0.05	4
	5 yr	9700	0.66	48	0.28	21	0.11	8
	10 yr	14400	0.73	54	0.34	25	0.14	11
XS3	1.5 yr	2100	0.25	18	0.05	4	0.01	1
	2 yr	4150	0.45	33	0.09	7	0.04	3
	5 yr	9700	0.65	49	0.24	18	0.08	6
	10 yr	14400	0.77	57	0.33	24	0.10	8
XS4	1.5 yr	2100	0.44	33	0.12	9	0.04	3
	2 yr	4150	0.59	44	0.23	17	0.07	6
	5 yr	9700	0.85	63	0.36	26	0.12	9
	10 yr	14400	0.93	69	0.42	31	0.14	11
XS5	1.5 yr	2100	0.39	29	0.10	8	0.06	4
	2 yr	4150	0.56	41	0.19	14	0.11	8
	5 yr	9700	0.89	66	0.34	25	0.20	16
	10 yr	14400	1.12	84	0.31	23	0.25	18

Table 9. Reach Averaged Maximum Particle Size Entrained (mm)

	Channel	Left Overbank	Right Overbank
1.5 yr	31	8	4
2.0 yr	38	13	6
5.0 yr	52	22	10
10.0 yr	60	25	12

Two pebble counts were performed; one within the low-flow active channel, and one above the low-flow channel within bankfull. The combined pebble counts are graphed as a cumulative particle size distribution curve (Figure 23). The median bed particle size (D_{50}) in the active channel is 20mm and the median bed particle size across the bankfull channel width is 18mm (see Figure 23).

The results in Table 9 show that less than the 1.5-year flow event will mobilize from the channel (i.e., low-flow channel) all particle sizes stored at the Sunol dam site. The 1.5-year event will also mobilize from the left bank bar the median particle size stored at Sunol dam (approximately 6mm), but will not be sufficient to mobilize all particle sizes through the D_{84}, 25mm (see Table 2).

A 5-year to 10-year flow event is necessary to mobilize the D_{84} particle sizes found behind Sunol dam on the bar.

2.5 Channel Morphology and Fish Passage at Niles & Sunol Dam

The geomorphic objective for dam removal at both dam sites is to allow Alameda Creek to restore to a naturally functioning channel with appropriate planform, pattern, slope, and dimensions. It is assumed that if these geomorphic objectives are met, then the channel will also provide fish passage, one of the two stated goals of the dam removal project. There has been considerable discussion with the agencies prior to development of the CER and also during the course of this present Study regarding the extent of removal of the structural components of the dams in order to meet the goals and objectives of the project. For this Study, the Consultant Team evaluated the potential influence that structural features remaining in the channel, as proposed in the CER, may have on channel morphology. The following criteria are used to evaluate the CER dam removal plan and to function as design guidelines for appropriate restoration of the channel:

1. The bankfull width of the channel should not be impaired by any structures.
2. The floodprone width of the channel should not be substantially impaired by any structures (maintain 90% of the floodprone width, allowing up to 10% encroachment).
3. The crest elevation of the dam should not be above the historic, pre-dam elevation of the channel bed.
4. Velocities through any remaining dam structures should not exceed the range of 6 ft/sec to 8 ft/sec for the 2.0-yr flow event, (unless velocities are greater than this range under natural channel conditions when there are no dam related structures).

Criteria 1, 2, and 3 are based on geomorphic principles that define channel form and function. The bankfull discharge is that flow which forms and maintains the channel by transporting the most sediment over the long-term. Thus, the bankfull discharge is responsible for the average morphologic characteristics of the channel (Rosgen, 1996). The bankfull discharge is generally closely associated with the 1.5 to 2.0 yr flow-event on alluvial rivers. For Alameda Creek the bankfull discharge is approximately 2,000 to 4,200 cfs at the Niles and Sunol dam sites. The bankfull width is the surface width of the channel at the bankfull stage (depth). By restoring the natural bankfull width at each dam site, the width-to-depth ratio (bankfull width to mean bankfull depth) is maintained. This is important because the width-depth ratio governs the distribution of energy in the channel (Rosgen, 1996). Channels that have high width-depth ratios (relatively shallow and wide), distribute energy and shear stress toward the banks, increasing the potential for bank erosion as the width-depth ratio increases. The best way to ensure that the natural width-to-depth ratio of the channel is restored is not to encumber the bankfull width of the historic channel with dam abutments, etc.

The floodprone width of the channel is measured at twice the maximum depth of the bankfull channel. The floodprone width may include an active floodplain and low-terraces, and corresponds with higher flows, such as that approaching the 50-year flood event. The ratio of floodprone width to bankfull width defines the entrenchment ratio, which is discussed in section 4.1.2. In the more highly entrenched streams, the floodprone width is not significantly larger than the bankfull width

(up to 40% greater), while in the more moderately entrenched streams, the floodprone width may be up to 120% greater than the bankfull width. If dam structures such as abutments impinge on the floodprone width of the channel, then in effect this increases the entrenchment ratio, altering the vertical relationship of the river to its valley. Altering the floodprone width of the channel may also influence the ability of the river to laterally adjust its position. By maintaining the floodprone width, the channel is free to laterally erode and deposit sediments, and to establish the lateral position of its thalweg. For these reasons, the criteria call for maintaining the historic, pre-dam floodprone width with only minimal obstruction permitted. Since the floodprone width is always at least equal to, and typically somewhat greater than the bankfull width, then the requirement to maintain floodprone width will control the final channel width for dam removal purposes. Bankfull and floodprone channel width at each dam site were identified in the field using the techniques and indicators described by Rosgen (1996).

Criteria 3 and 4 are related to restoring the channel to provide fish passage (Criteria 3 is related to both restoring the channel morphology and fostering fish passage). Criteria 3 calls for lowering the dam crest elevation to the elevation of the historic, pre-dam bed. The channel will seek to re-establish its historic elevation and gradient, (assuming there have been no significant changes in the flow or sediment regime since dam construction, or already underway prior to dam construction). If the dam crest is insufficiently lowered so that it remains above the natural bed elevation, then it could pose a barrier to fish passage, for example, by requiring an excessive jump height. Criteria 3 may also be considered a fundamental geomorphic principle in that a channel will seek to attain a grade that is in direct response to the present-day flow and sediment regime. If the equilibrium stream gradient is altered (by changing the bed elevation) there will likely be channel responses such as adjustments in the channel width, sinuosity, or bed particle size.

Changes in historic land-uses in the Alameda Creek watershed may have altered the flow-sediment regime relationship that existed prior to dam construction. Such land-use changes may have initiated channel incision. Observations of exposed tree roots during the field inspection of Alameda Creek could be indicative of channel incision. However, whether or not channel incision has occurred, the extent to which it has occurred, and if it is continuing to occur into the future was not a part of this Study, and is not known at this time. Therefore, without trying to make a very difficult prediction as to an equilibrium channel gradient at some point in the future at either dam site, it is recommended that the historic, pre-dam bed elevation be used as the best estimate for the crest elevation in a restored channel. Monitoring and mitigation options to address problems that may arise in the future due to potential for channel incision, or to exposing the crest of the dam are discussed in section 4.0, Conclusions and Recommendations.

The fourth criteria requires velocities to be no greater than the range of 6 ft/sec to 8 ft/sec for a 2.0-year flow event (4,200 cfs), unless the natural velocities (without a dam structure) are already greater than this range. The 2.0-year flow is assumed to be about the highest discharge during which fish may be migrating upstream. In order to provide fish passage, velocities should not exceed the range of 6 ft/sec which is the maximum prolonged swim speed for adult salmonids (Flosi et. al., 1998) to 8 ft/sec (Bell, 1984) which is the recommended average maximum velocity through an orifice. Flow velocities may be higher than this range (for a 2.0-year event) under natural conditions. In that case, the criteria do not apply.

Each dam site is evaluated against the fore-listed criteria.

2.5.1 Niles Dam

The CER Niles dam removal alternative is shown in Figure 10. This alternative retains sections of the left and right abutments. The abutments are to be protected with boulders and cobble. There is a 60 ft wide opening for the channel between the abutments, but the true effective width of the opening is 42 ft accounting for the boulder protection. The natural bankfull width of the channel at this location is approximately 120 ft, and is shown in Figure 28 at an estimated stage of 112.6 ft., which is below the remaining dam abutments at elevation 115.5. Thus the bankfull width of the channel is reduced by approximately 1/3 in this plan, which does not meet the geomorphic design criteria listed above. The potential effect of the CER alternative on fish passage is further evaluated below using hydraulic modeling to estimate flow velocities under varying discharge conditions.

The floodprone width of the channel is approximately 140 ft (see Figure 28), shown at elevation 116.8. The floodprone stage overtops the remaining abutments by approximately 1.3 ft. Allowing for only minor encroachment defined in the criteria (up to 10%), there should be no abutments, etc. within a channel opening of 126 ft wide, which is not much larger the 120 ft bankfull width at this location. Neither the bankfull or floodprone width criteria are met.

The historic pre-dam bed elevation at the Niles dam site is 108.4, which is 6.9 ft below the dam crest (see Section 2.2, Impounded Sediment Volume). The longitudinal profile in Figure 12 defines this elevation. The CER alternative indicates that the dam should be removed down to its original foundation, and indicates that the original streambed is no more than 5 ft below the dam crest, although a specific elevation for crest removal is not cited in the CER. Based on the estimate that the dam crest would be lowered by 5 ft, this places the CER restored bed elevation at approximately 110.4, which is 2.0 ft above the historic stream bed elevation of 108.4.

An alternative (Study Alternative) has been shown on Figure 28 and Figure 29 that meets the proposed criteria listed in Section 2.5. In addition, the Study Alternative meets the SFPUC-Engineering Design Bureau criteria request for the right abutment that will be further reviewed during final design (pers. comm. Buitrago, Joseph, 2004). However, other alternatives that meet the criteria in Section 2.5 can be reviewed and selected during final design.

Fish Passage Hydraulic Analysis at Niles Dam Site

Fish passage through the proposed configuration of Niles Dam was evaluated by conducting a hydraulic analysis of the proposed dam modification. The original HEC-RAS model of the site (Trihey & Associates 2000) was revised to reflect the Niles Dam configuration proposed in the CER. The procedure is described below. The results of the hydraulic analysis include velocity and depth through the remaining "notch" in the dam structure.

To simulate the proposed modification, a cross section of the current dam was created based on the 1914 cross section presented in the CER (see Figure 8). Although the height of the dam is not displayed on the 1914 drawings, Geomatrix (2004) suggested that it is about five ft from the top of the dam to the channel bed. Trihey & Associates (2000) estimated the natural bed elevation at the dam to be 6.9 ft below the top of the dam based on interpretation of the survey data, including a longitudinal profile of the creek bed. In addition, Trihey & Associates (2000) surveyed the plunge pool at the base of the dam and found it to be 5.4 ft below the top of the dam.

This cross section was then modified to reflect the dam being notched as per the CER alternative (see Figure 10). The new cross section has a trapezoidal opening in the center of the channel with a bottom width of 60 ft and a top width of 84.4 ft. The CER also proposes adding riprap around the abutments for protection. This was modeled in HEC-RAS by increasing the roughness coefficient to .07 in the area where the riprap boulders would be located (Figure 24). The depth of the opening is 6.9 ft from the top of the dam (listed as elevation 112.85 ft on the 1914 plans, Crystal Springs datum).

The HEC-RAS analysis was conducted for this modified cross section under three flows, including:

- 1.25-year flow of 1,560 cfs
- 1.5-year flow of 2,000 cfs
- 2.0-year flow of 4,200 cfs

The HEC-RAS simulation of the existing cross section (with the dam in its present-day configuration) shows that flows spread across the full width of the channel for all three discharges simulated. The velocity ranges from a minimum of 1 ft/sec to a maximum of 10 ft/sec for the 1.25–year event and from a minimum of 1 ft/sec to a maximum of 12 ft/sec for the 2-year event. Fish would have to pass these velocities to access upstream areas.

The hydraulic conditions of the proposed CER alternative cross section of Niles Dam was simulated and shows that the flow for the 1.25 and 1.5–year events would be contained in the notch and the 2-year event would nearly fill the notch (Figure 24). The velocity for the 1.25-year event ranges from 1 ft/sec to 8 ft/sec. At the 2-year flow, the velocity ranges from 1 ft/sec to 11 ft/sec, with most of the center of the notch reaching 11 ft/sec. (Table 10, and Figure 25). These velocities are compared to criteria for fish passage in Section 3.4.

Table 10. Velocity Distribution Across Niles Dam Under CER Alternative

Starting and Ending Station		1.25-Year Discharge 1560 cfs	1.5-Year Discharge 2000 cfs	2.0-Year Discharge 4200 cfs
From Station	To Station	Velocity	Velocity	Velocity
68.6	70.3	--	--	1.0
70.3	72	--	--	3.4
72	73	--	1.2	3.4
73	74.6	1.4	5.7	3.4
74.6	78.9	5.0	5.7	6.9
78.9	134.9	8.0	9.0	11.0
134.9	139.2	6.9	7.8	9.2
139.2	143.5	3.2	4.2	5.0
143.5	144.9	1.0	2.0	3.6
144.9	146.34	--	2.0	3.6
146.3	151.2	--	-	1.4

2.5.2 Sunol Dam

The CER alternative for removal of Sunol Dam is shown in Figure 7. Sunol Dam is located at an apparent constriction in the valley width, so that on the upstream side of the dam the valley is more narrow than on the downstream side. There is flow expansion as Alameda Creek passes over the dam site, and this expansion along with the additional energy dissipation caused by the vertical drop over the dam and into the plunge pool, causes sediments to deposit creating the large bar against the left bank.

Cross-sections surveyed for the upper hydraulic modeling site, located immediately below Sunol Dam were used to estimate the bankfull and floodprone width of the channel. The bankfull width is approximately 155 ft (at an estimated elevation of 5.1 ft above the historic bed elevation, 199.6 ft) and the floodprone width is approximately 185 ft (at an estimated elevation of 10.2 ft above the historic bed elevation, 204.2 ft), as shown in Figure 26. The alternative proposed in the CER removes most, though not all, of the abutments on the left and right banks. The channel width through the lowered dam crest under the CER alternative is approximately 155 ft, which meets the criteria for maintaining the entire natural bankfull width. The natural floodprone width of 185 ft is slightly encumbered by the remaining abutments. Allowing for only minor encroachment into the floodprone width (10% defined in the criteria), then a floodprone width of approximately 166.5 ft should be maintained. This would require removing a total of 16.5 ft of additional abutment in order to meet the floodprone width requirement. This is further discussed in Section 3.0, Findings.

The CER alternative would remove 8 ft of the dam crest, plus an additional 3 ft in a notched area near the right bank for a low-flow channel. The total depth of removal over the notched area would be 11 ft. The CER does not specify the final elevations of the lowered dam crest, but we assume that it would be starting from the elevation identified in historic construction drawings for the dam, 205.0 ft (this is the Crystal Springs datum shown in the construction drawing of 201.25 + 3.77 = 205.0 ft to adjust to the NGVD 29 datum). The lowered crest elevation would be 194.0, which is very close to the historic, pre-dam bed elevation of 194.4 estimated for this Study. This is to be the final elevation for the low-flow notch only, so that the remainder of the dam crest would be at a higher elevation, 197.0 which is estimated to be approximately 2.6 ft above the historic bed elevation of 194.4.

An alternative (Study Alternative) has been shown on Figure 26 that meets the proposed criteria listed in Section 2.5. In addition, the Study Alternative meets the SFPUC-Engineering Design Bureau request for the left abutment that will be further reviewed during final design (pers. comm. Buitrago, Joseph, 2004). However, other alternatives that meet the criteria in Section 2.5 can be reviewed and selected during final design.

No velocity modeling of the CER design was performed at Sunol dam because the criteria for bankfull width is completely met. Since the 2.0-year flow approximates the bankfull channel width and there is no narrowing of the bankfull width under the CER design, then there can be no influence on the natural flow condition up to the bankfull discharge. Thus there is no reason to expect that velocities will exceed the stated criteria (note that natural channel velocities could exceed the 6 ft/sec to 8 ft/sec range, but this would not be related to any remaining dam infrastructure).

2.6 Sediment Deposition and Maintenance Activities in the ACFCWCD Channel

ACFCWCD provided information collected on the location and magnitude of sediment excavation performed to maintain the capacity of their flood control channels (Alameda County, 1999). During the August 19 stakeholders meeting, ACFCWCD stated that they remove approximately 100,000 yds^3 of sediment for each of three years on a 10-year cycle, for a total removal of 300,000 yds^3 per 10-year period (pers. comm., Richard Wetzig, ACFCWCD). These sediments are removed from a 3-mile stretch of channel between Ardenwood Road and DeCoto Road. No data are available on particle sizes associated with the desilting activities.

Sediment accumulation volumes were calculated by ACFCWCD (Alameda County, 1999). There were eight desiltation projects between 1975 and 1999 over a distance of 8 miles out of a total 11.1 miles of flood control channel (desiltation activities were not carried out over the entire 8 mile length, as the treated reaches are discontinuous in length). Some of this total length includes overlapping channel reaches that have been desilted more than once. A total of 863,000 yds^3 have been excavated for these eight maintenance projects between 1975 and 1999.

We compared the total sediment load carried by Alameda Creek (measured at Niles gage) beginning from construction of the flood control channel in 1965 (some parts were constructed in 1975) through 1999, which is the last maintenance activity scheduled at the time of the 1999 report. The total Alameda Creek sediment load from 1965 through 1999 was 4,5000,000 yds^3 (7,600,000 tons).

The ratio of Excavated Sediment Load/ Total Sediment Load describes the proportion of the total Alameda Creek sediment load that has been excavated from the flood control channel. This ratio is 863,000 / 4,498,470 = 0.19. Thus, over the long-term, approximately 19% of the sediment load carried by Alameda Creek has been excavated for maintenance of the flood control channel[1].

[1] Data subject to slight revision based upon the actual start-up date (possibly as late as 1975) of the flood control channel.

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3. FINDINGS

Findings are organized according to the principal issues and objectives investigated for this Study:

3.1 Particle sizes stored at the dam sites

3.2 Sediment volumes stored at the dam sites

3.3 Routing and disposition of sediment released from the dam sites

3.4 Channel geomorphology and fish passage associated with dam infrastructure removal

3.1 Particle Sizes Stored at the Dam Sites

The available particle size data collected from previous studies at the Niles and Sunol dam sites were reviewed and assessed. The following are the findings from this data:

(1) At Sunol Dam the particle size composition is approximately 1/4 to 1/3 sand ($\leq$ 2mm) and 2/3 to 3/4 gravel.

(2) At Niles Dam the particle size composition is approximately 1/4 sand and 3/4 gravel.

(3) The particle size data collected was spatially limited (in both the vertical depth and in the horizontal longitudinal profile through the inundation zones) at both dams, and therefore could not detect potential sediment size sorting within the stored sediments. However, it is unlikely that there would be a strong trend in particle size sorting in either the vertical or in the horizontal at either dam site that would lead to significantly different proportions of sand and gravel described above.

(4) The median particle size (D_{50}) at both dam sites is very fine gravels, from 3mm-15mm (b-axis diameter).

(5) The particle sizes stored at the Sunol and Niles dam sites are similar, though slightly finer than that found within the bankfull channel downstream from Sunol dam, as measured by pebble counts at the two hydraulic modeling sites (see Figure 17 and Figure 23). The median particle size at the lower modeling site is 9mm and at the upper modeling site is 18mm, which is very similar to that measured in the reservoirs. However, inspection of the complete particle size distribution curve at the two modeling sites also indicates that there is a larger proportion of coarser materials at the modeling sites than in the reservoirs. The D_{84} at the two modeling sites are 64mm and 42mm, while the coarsest sample at the reservoirs was 45mm and most samples were about 20mm.

(6) Previous conclusions from hydraulic modeling (Trihey & Associates) indicated that in normal and above normal water years, the sediments stored at both dam sites would be

mobilized and transported downstream. This conclusion is not altered by the present Study.

A sediment pulse introduced to a river may either be translated downstream as a sediment wave, dispersed in place, or undergo a combination of translation and dispersal. Flume experiments have shown that the dominant mode of sediment pulse elimination is dispersion unless the pulse sediment is significantly finer than the sediment naturally transported by the river, in which case both translation and dispersion were significant modes of sediment pulse elimination (Cui et. al., 2003). It is expected that a sediment pulse will undergo dispersion since the sediments sizes stored in the Niles and Sunol reservoirs are generally similar to the sizes measured in the downstream channel and the sediment load transported by Alameda Creek (based on inspection of USGS particle size data in suspended and bedload samples at the Niles gage). This is important because sediment pulse elimination by dispersion means that the sediments will not be wholly transported as an identifiable, coherent sediment wave (as in a translation mode), but rather by gradual dispersion, thus reducing the likelihood of significant aggradation in any one river reach.

3.2 Sediment Volumes Stored at the Dam Sites

Sunol Dam

This Study concludes that the most likely volume of sediment stored at Sunol Dam is 37,000 cubic yards. It is acknowledged that relatively small differences in the slope of the historic and present-day bed profile will result in different volumes of sediment. Geomatrix (2004) estimated a stored sediment volume of 9,000 cubic yards to 15,000 cubic yards.

Additional topographic surveys of the bed profile upstream from the Sunol Dam inundation zone would provide further information to support an estimate of the sediment volume by adjusting the approximate bed slope through the Sunol dam reach. However, even additional topographic surveys will not be definitive. There is always the potential for local gradient changes at the dam site or anywhere within the inundation zone that is buried under the stored sediment and therefore cannot be accounted for by conducting a topographic survey today.

Niles Dam

The estimate of the stored sediment volume behind Niles Dam is 2,200 yds^3. This is the same estimate provided by Trihey & Associates (2000), and within the conservative estimate of 2,800 yds^3 established by Geomatrix (2004).

3.3 Routing and Disposition of Sediment Released from the Dams

In order to predict potential effects of releasing sediments stored at the dam sites on Alameda Creek and on the ACFCWCD flood control channel, it is useful to compare the amount of sediment stored at the two dam sites with the total sediment load carried by Alameda Creek. Using this approach provides a way to scale the amount of sediment stored at the dams (The Aspen Institute, 2002). This section also evaluates how Alameda Creek may respond to a sediment pulse released from the dams based on field investigations that characterize channel morphology.

Table 11 shows the high and low range of sediment volumes estimated for this Study and from the CER. The stored sediment volumes were converted to tons using 1.68 tons/yd^3 for poorly graded sand and gravels (Lindeburg, 1986). Totaling the combined sediment from the two dam sites, there is 66,864 tons of sediment based on the high estimate, and 16,296 tons based on the low estimate.

The average annual total sediment load (suspended + bedload) is 269,000 tons/yr and the median annual sediment load is 72,000 tons/yr. The average annual sediment load transported by Alameda Creek exceeds the high estimate of stored sediments by a factor of 4x and exceeds the low estimate of stored sediments by a factor of 16.5x. The median annual sediment load of Alameda Creek and the total stored sediment at the two dam sites is nearly the same. Another way to look at this is that a 3.5-year flow event (7,000 cfs) will transport the high estimate of the total stored sediment load at the dam sites over the course of one day and a 1.7-year flow (2,600 cfs) will transport the low estimate of the total stored sediment load. Thus, the amount of sediment stored at the dam sites is a relatively small proportion of the total sediment load transported on an annual basis by Alameda Creek. When the reservoir sediment volume is small relative to the annual sediment transport capacity, the impact on the downstream channel is likely to be small (Randle, 2002). On this basis, it is unlikely that there would be any long-lasting or significant adverse geomorphic effects if the stored sediments were to be released from the dam sites to be naturally transported downstream.

Table 11. Sediment Storage at Sunol and Niles Dam Sites

Stored Volume (yd^3)	Tons
Sunol	
9,000	15,000
37,000	62,000
Niles	
700	1,200
2,800	4,700
Combined Total	
9,700 (Low estimate)	16,000
40,000 (High estimate)	67,000

A sediment pulse associated with dam removal is very likely to be within the natural range of variability of sediments supplied to the channel on an annual basis, for example a sediment pulse introduced by landslides. The Franciscan Melange geology is located within the inner gorge areas of Alameda Creek upstream from Sunol dam, within the vicinity of Sunol Regional Park. This type of geology is known to be subject to extensive mass wasting which can deliver large amounts of sediment. As an example, a single slide that is 1000 ft high x 200 ft wide x 5 ft average depth would generate 37,000 yds^3 of material, which is equivalent to that estimated stored at Sunol dam. Landslides that have dimensions that are comparable to this example have been observed within Sunol Regional Park.

There will be at least some, short-term (here defined to be on the order of about 10-years) adjustments of the channel if the stored sediments are allowed to be naturally transported downstream. Predicting the nature, location, and persistence of channel adjustments is at best

challenging. The nature and extent of channel adjustments depends on the magnitude of sediment released, the grain-size distribution of the sediment pulse, and the morphologic characteristics of the channel downstream. What is the likely fate of a pulse of sediments released from behind the dams and its influence on channel morphology? Pool-riffle channel types have a significant potential for channel geometry responses (change in width, depth, or slope) to perturbations in sediment supply (Montgomery and Buffington, 1997). Changes in both channel and valley sediment storage are also likely responses, as well as changes in channel roughness due to alteration of channel sinuosity and bedforms (Montgomery and Buffington, 1997).

A likely change due to a sediment pulse from the dams is to expand the existing sediment storage features. Thus, we anticipate an increase in the height, and possibly the length and width of bars, accretion of sediments along the natural river levees, and sediment deposition on reaches that have adjoining floodplains. Some sediments are also likely to deposit on the channel bed, and there may be general aggradation of the channel and filling of some pools. None of these sediment storage features are considered to be long-term sediment storage sites (>100 years), but they will all function to moderate the sediment wave as it moves downstream. This is particularly true for Sunol dam since this is the much larger sediment source, and most of the floodplain areas and bars were observed to be upstream from Niles dam (see Table 4 and Table 5). Bars and river levees can be expected to store deposited sediments for about 2 years, on average, before there is a flow sufficient to mobilize the bar material and transport it downstream to the next bar, levee, or floodplain. This finding is based, in part, on the results of the initiation of motion assessment at the upper hydraulic modeling site near Sunol dam (see Table 9). Floodplain areas that receive sediment deposits would store those sediments for a longer time period, probably on the order of about 5 years, on average. This is based on the results of the initiation of motion assessment for the lower hydraulic modeling site. Portions of the floodplain that are at a lower elevation and closer to the channel will scour sediments about once every other year, while the more distant portions of the floodplain will not receive flows sufficient to scour sediments except about once every 10 years. A single sediment particle can move downstream from tens to several thousand ft during an annual high flow event before it is deposited and stored on a bar. That same particle may not be mobilized for a couple of years before there is a flow sufficient to scour the bar and again transport that particle further downstream where it is to be re-deposited on the next bar feature. In this way, the sediment storage features will moderate and attenuate a sediment pulse. The actual fate of sediments, whether or not they are deposited on bars and floodplains, and how long they may be stored, will very much depend on the magnitude and sequence of high flows following dam removal. There is always uncertainty associated with predicting the magnitude and sequence of high flows for any given series of years over the short-term.

Over the long-term, we anticipate that nearly all of the sediment pulse, if released from the two dam sites, will reach the ACFCWCD flood control channel. The first wave of suspended sediment from both Niles and Sunol dam sites would probably pass the Niles gage and the flood control channel at Niles Junction within a couple of years. The moderating influence of the sediment storage features will probably cause some suspended and bedload sediments to take several decades before reaching the flood control channel.

The specific fate of sediments once they reach the ACFCWCD flood control channel is also complicated and challenging to predict. This Study did not evaluate the capacity of the flood control channel to transport sediments. Backwater from bay tidal influences in the lower reaches of the flood

control channel and several inflatable dams will all exert an influence on sediment transport capacity. However, some proportion of the total sediment load delivered by Alameda Creek is transported through the flood control channel, or temporarily deposits in locations that do not require excavation in order to maintain flood capacity. Using the calculated ratio of excavated sediment load/ total sediment load, approximately 19% of the sediment yield from Alameda Creek must be removed by the ACFCWCD to maintain the flood control channel.

3.4 Channel Geomorphology and Fish Passage Associated with Dam Infrastructure Removal

Sunol Dam

The alternative proposed in the CER removes most of the abutments on the left and right banks. The channel width through the lowered dam crest under the CER alternative is approximately 155 ft, which meets the criteria for maintaining the entire natural bankfull width. The natural floodprone width of 185 ft is slightly encumbered by the remaining abutments. Allowing for only minor encroachment into the floodprone width (10% defined in the criteria), then a floodprone width of approximately 166.5 ft should be maintained. This would require removing a total of 16.5 ft of additional abutment in order to meet the floodprone width requirement. This additional 16.5 ft should probably come from the 20-foot wide remaining section of the left abutment, which is currently shown in Figure 7 as a beveled cut from top to bottom. After removal of the additional 16.5 ft of abutment there will be only a few ft of concrete abutment remaining that wraps around the left hillslope.

Since the entire bankfull width, and nearly all of the floodprone width of the channel will be restored, there is virtually no opportunity for sediments presently stored behind the dam to remain in storage if they are allowed to be naturally transported downstream. The width of the reservoir relative to the active width of the river channel is an indicator of how much sediment will be released from the reservoir (Randle, 2002). When a reservoir is many times wider than the active river channel, then the river may not be capable of eroding the entire reservoir sediment volume. Since the reservoir width and the bankfull width of Alameda Creek (upstream from Sunol Dam) are virtually identical, it is very likely that all of the reservoir sediment volume will eventually be subject to erosion and transport downstream.

The CER alternative would remove 8 ft of the dam crest, plus an additional 3 ft in a notched area near the right bank for a low-flow channel. The total depth of removal over the notched area would be about 11 ft. The lowered crest elevation would be 194.0 where the channel is notched, which is very close to the historic, pre-dam bed elevation of 194.4 estimated for this Study. This is to be the final elevation for the low-flow notch only, so that the remainder of the dam crest would be at a higher elevation, 197.0 which is estimated to be approximately 2.6 ft above the historic bed elevation of 194.4.

The portions of the dam crest that are designated to be at elevation 197.0 should be lowered to the historic bed elevation of 194.4, matching the elevation of the proposed low-flow notch (which should also be set at 194.4) and meeting the criteria listed in section 2.5. This would, in effect,

eliminate the low-flow notch since the dam crest will all be at the same elevation. The elimination of the low-flow notch will allow the channel to naturally define the position of the thalweg.

The CER Alternative compared to this Study evaluation criteria (Section 2.5) follows:

1. Bankfull Width – meets criteria;
2. Floodprone Width – does not meet criteria;
3. Historic Stream Bed Elevation– does not meet criteria; and
4. Fish Passage Velocity – does meet criteria.

Niles Dam

The alternative proposed in the CER retains sections of the left and right abutments. The abutments are to be further protected with boulders and cobble. There is a 60 ft wide opening for the channel between the abutments, but the true effective width of the opening is 42 ft accounting for the boulder protection. The natural bankfull width of the channel at this location is approximately 120 ft. The bankfull width of the channel is significantly reduced and does not meet the geomorphic design criteria. It is possible that the remaining abutment against the right bank may prevent some sediments that are behind the abutment and currently well-vegetated to remain in place even if the SFPUC elects to allow the river to naturally erode and transport the sediments presently stored in the reservoir. These sediments could be mechanically excavated out of the channel, but it is very likely that new sediments transported during future flow events will continue to deposit behind the remaining abutment, and thus Alameda Creek would not be fully restored to a natural condition. A 120-ft opening should be achieved to match the bankfull width criteria. The floodprone width criteria, requiring a channel width of 126 ft is also not met, and therefore additional abutment lengths (66 ft plus the boulder revetments proposed to protect the remaining abutments should be removed in order to achieve the floodprone width criteria.

The potential effect of the CER alternative on fish passage was further evaluated with a hydraulic model to estimate flow velocities through the notched dam opening. The hydraulic model simulated flow conditions for a range of flows, from 1560 cfs to 4200 cfs (a 1.25 to 2.0-year flow, respectively). Average velocities for the 2-year event through the dam as proposed in the CER alternative ranged from 1 to 11 ft/sec (see Table 10 and Figure 24). In order to provide fish passage, velocities should not exceed the range of 6 ft/sec which is the maximum prolonged swim speed for adult salmonids (Flosi et. al., 1998) to 8 ft/sec (Bell, 1984) which is the recommended average maximum velocity through an orifice. Most of the center of the notch will exceed these criteria during a 2-year event, although there is a velocity gradient through a small portion of the right and left margins of the notch that do not exceed the criteria (see Figure 25). The 1.25-year and 1.5-year events have slightly larger proportions of the notch that do not exceed the criteria. It is our interpretation that, overall, the velocity criteria are not met during the 2.0-year event, and only marginally met for the 1.5-year and 1.25-year flows. It should also be noted that the simulated 1.25, 1.5, and 2.0 – year flows generally occur only during a few days in any given year. On most days flows are lower than these peak discharges, therefore velocities will be less than those shown for the simulations.

The historic pre-dam bed elevation at the Niles site as determined by this Study is 108.4, which is 6.9 ft below the dam crest (see Section 2.2, Impounded Sediment Volume). The CER alternative indicates that the dam should be removed down to its original foundation, and indicates that the original streambed is no more than 5 ft below the dam crest, although a specific elevation for crest removal is not cited in the CER. Based on the estimate that the dam crest would be lowered by 5 ft, this places the CER restored bed elevation at approximately 110.3, which is 1.9 ft above the historic stream bed elevation of 108.4 proposed in this Study. This does not meet the criteria to minimize the potential for creating a fish passage barrier by lowering the dam crest to the historic bed elevation.

The CER Alternative for Niles Dam Removal compared to this Study evaluation criteria (Section 2.5) for geomorphology and fish passage follows:

1. Bankfull Width – does not meet criteria;
2. Floodprone Width – does not meet criteria;
3. Historic Stream Bed Elevation– does not meet criteria; and
4. Fish Passage Velocity – does not meet criteria

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4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Sediment Volume and Sediment Release from Niles and Sunol Dams

Sediment volume at the Sunol dam site was re-evaluated based on the data provided in the CER and prior studies by Trihey & Associates. The revised estimate in this Study is 37,000 yds^3 which is 2.5 times the CER estimate of 15,000 yds^3. Relatively small adjustments in the estimated bed slope up-and-downstream from the dam, and the extent of backwater deposition caused by the dam, alters the sediment volume estimate. Therefore, some uncertainty remains as to the total sediment volume. Additional field surveys of the bed topography upstream from the dam could support, or cause an adjustment to this sediment volume estimate. Although additional topographic field surveys could improve on the estimated volume, it would not eliminate this uncertainty. The uncertainty surrounding the amount of sediment stored at the Sunol dam site does not alter conclusions regarding the relative capacity of Alameda Creek to transport the sediment load stored at the dams (see discussion below).

The best estimate of the amount of sediment stored at the Niles dam site according to this Study is 2,200 yds^3. This is within the higher portion of the range estimated by the CER (700 yds^3 to 2,800 yds^3). The estimate of the total combined sediment stored at the two dam sites is 39,200 yds^3. This is a small amount of sediment relative to the average annual sediment yield for Alameda Creek, 160,000 yds3/yr (270,000 tons/yr).

Allowing sediments stored behind both dams to naturally erode and transport downstream is a feasible alternative to excavating and end-hauling sediments, which is the option recommended in the CER. The influence of a sediment release on channel morphology and aquatic habitat is not likely to be significant, and will most likely cause the type of adjustments that are within the range of natural variability experienced by the channel. Sediments released from the dam sites will be dispersed over a period of several decades to the downstream reaches. There may be localized aggradation and in-filling of pools, but this would not be a long-term persistent condition. The dominant response of the channel is anticipated to be an enlargement of existing sediment storage features such as bars and natural river levees, and some deposition on the floodplain where the channel is less entrenched. These sediment storage features will moderate the sediment pulse released from the dams.

These conclusions are supported by the following evidence:

(1) The amount of sediment stored behind the dams is relatively small compared to the sediment load transported by Alameda Creek

(2) There are natural sediment storage features that will moderate the pulse of sediment as it travels downstream

(3) The sediment pulse will be eliminated in a dispersional, rather than a translational mode, reducing the likelihood of significant aggradation in any one river reach

The exact fate of sediments once they reach the ACFCWCD flood control channel is not easily predicted. A model for sediment transport through the flood control channel does not currently exist. Sections of the flood control channel are subject to sediment deposition, requiring excavation to maintain flood capacity. Since the flood control channel was initially constructed in 1965 (some parts were not constructed until 1975) 863,000 yds^3 have been excavated. This is about 19% of the total Alameda Creek sediment load (as measured at the Niles gaging station)[1]. The current ACFCWCD maintenance program desilts approximately 300,000 yds^3 of sediment every 10 years. Ultimately, nearly all 39,200 yds^3 of sediments, if released by natural erosion from the Niles and Sunol dam sites, will reach the flood control channel over a period of a few decades. A portion of those sediments will potentially deposit in locations where they may need to be excavated.

The proposed Project under EIR review entails an evaluation of either releasing or retaining (or an alternative in between) sediments impounded at Sunol and Niles dams. This Study evaluates both fish habitat and geomorphic effects with the results summarized in Table 12, Summary Disposition of Sediments, Comparison of Sediment Removal vs Sediment Release. This summary table does not provide for effects beyond the scope of this Study that will be evaluated in the EIR process (e.g. – biological resource issues, environmental impacts during construction, cost). This Study concludes that 'sediment removal' behind the dams would have '*No Effect*' and that 'sediment release' (likely over several decades) would have "*Potential Effects, but not considered to be significant impacts to channel morphology or fish habitat above the flood control channel. There will be some sediment deposition in the flood control channel that present a maintenance issue.*" Further, in regards to the NOAA statement in their March 16, 2004, letter, "*...it is recommended by NOAA Fisheries that the extent of sediment removal be limited to the smallest amount necessary for removal of the Sunol Dam crest and foundation while providing for initial and long-term natural channel geometry. .....*", this Study does not provide any compelling justification to support the NOAA Fisheries position that the sediment removal at Sunol Dam should be limited to the smallest amount necessary.

[1] Data subject to slight revision based upon the actual start-up date (possibly as late as 1975) of the flood control channel.

Table 12. Summary Disposition of Sediments, Comparison of Sediment Removal vs Sediment Release

Geomorphic and Fish Habitat Effect	Sediment Removal	Sediment Release
Fish Passage	**No effect**	**No effect.** Although fish passage could be impaired during a period of years when sediments are first evacuated from Sunol Dam, anadromous species are not present in the channel at this time.
Fish Rearing and Spawning Habitat	**No effect**	**Limited effects are possible.** Pool in-filling and sedimentation of spawning gravels may occur as part of aggradation processes. Not expected to be wide-spread or persistent. Additional spawning size gravels will be recruited to reach, which is considered a benefit to fish habitat.
Aggradation in Natural Channel	**No effect**	**Limited effects are possible.** The size of the sediment pulse would be within the range of natural variability. Some aggradation may occur, mostly enlarging existing sediment storage features such as bars, and deposition on the floodplain, although new bars may also form, bed sediment storage and bed elevation may increase, and local channel gradients may be altered as sediments are transported downstream. Aggradation effects would not be a persistent, or a permanent channel change, and are not expected to be severe. Sediments will disperse downstream over about a decade.
Sediment Deposition in Flood Control Channel	**No effect**	**Effects are likely to occur.** Almost all sediments will eventually reach the flood control channel, over a period of one to a few decades. Some sediments will deposit in the flood control channel and some will pass through.
OVERALL RATING	**No Effect**	**Potential Effects, but not considered to be significant impacts** to channel morphology or fish habitat above the flood control channel. There will be some sediment deposition in the flood control channel, that present a maintenance issue.

4.2 Dam Infrastructure Removal

Sunol Dam

It is difficult to predict with certainty the exact historic bed elevation, or to predict either the likelihood or extent of potential incision below a pre-dam bed elevation at points upstream from the lowered dam crest in the future (as a response to watershed changes both in the past and ongoing today). The lowered dam crest itself, and bedrock that outcrops 1,000 ft downstream from the dam, will provide control on bed elevations in the reach immediately downstream from Sunol dam. These two control points should provide a moderating influence on potential channel incision, although local hydraulic forces could cause scour on the downstream side of the dam. Therefore, it is recommended that the estimated historic bed elevation of 194.4 be used as the design benchmark for dam removal purposes. This design elevation should be applied to the entire length of the dam crest, which will eliminate the low-flow notch design proposed in the CER alternative. This will ensure that none of the dam crest will be above the historic bed elevation and will additionally allow the channel to naturally position its thalweg. Lowering the rest of the dam crest will not alter surrounding groundwater elevations any further, since it is the bottom of the low-flow notch that determines the maximum groundwater elevation.

An adverse slope should be cut across the top of the dam to alter it from a broad-crested weir to a sharp-crested weir. This should be incorporated as a design element of the dam removal plan. The purpose of converting the dam to a sharp-crested weir is to reduce the risk that should the dam crest be exposed after removal, that it will not act as a fish barrier. This design approach was discussed and recommended by the Agency/SFPUC attendees during the August 19 meeting.

We further recommend an adaptive management approach that includes annual monitoring at the dam site following removal to ensure that the dam and channel response to crest lowering does not pose an unforeseen fish passage problem. The monitoring should extend over the time period needed to transport all of the sediments stored behind the dam. Should the dam crest become exposed due to local scour or incision of the channel in a manner that creates a fish passage problem, then mitigation actions should be implemented.

Based on the design presented in the CER, an additional 16.5 ft of the left abutment should be removed in order to provide an appropriate floodprone width through the dam site. SFPUC has advised the Consultant Team that there may be a practical limit to the extent of abutment removal due to geotechnical and stability issues that were outside the scope of this Study and that will be addressed by SFPUC, as may be required, during final design.

The Sunol CER Dam Removal Alternative does not meet two key geomorphology and fish passage criteria (floodprone width and historic stream bed elevation) established within this Study (Section 2.5). A Sunol dam removal alternative (Study Alternative) has been provided within this Study (Figures 26 and 27) that meets all key criteria. However, other acceptable alternatives could likely be developed during final design that also meet the established criteria. While there are competing issues that will likely influence the Sunol dam removal alternative that is selected during

the EIR process; it is nevertheless recommended that the selected alternative meet the criteria established within this Study, especially in regards to fish passage which is one of the SFPUC stated Project objectives.

NOAA Fisheries (person. com. Jonathon Mann, 2004) has proposed that consideration be given to lowering the Sunol Dam crest to the down-gradient (1,000 ft) bedrock elevation control point (approximately 193.0 USGS) to avoid any uncertainties (e.g. - crest re-exposure, data resolution, demolition tolerances, local scour) associated with establishing the historic streambed elevation (approximately 194.4 as determined by this Study). The down-gradient bedrock elevation control point meets the criteria established within this Study and is therefore deemed an acceptable alternative. The final design elevation of the lowered Sunol Dam crest should be evaluated in concert with other competing resources that are outside the scope of this Study (e.g. - riparian habitat, biological resources, and cost) during future Project phases. Should the down-gradient bedrock elevation control point be chosen as the elevation of the lowered Sunol Dam crest, it is recommended that a construction survey be conducted at the time of the Sunol dam crest removal that includes the bedrock (1000' down-gradient) as a construction control point.

The March 16, 2004, NOAA Fisheries letter requested at Sunol Dam that, *"...The removal design should be sufficient to allow for initial and long-term dynamics to occur without interaction with the remaining dam structure. The extent of dam removal should provide for meandering of the low flow channel and avoid the re-exposure of any of the remaining foundation of Sunol Dam over the long term....."*. This Study concurs with the NOAA Fisheries statement and has developed criteria and potential alternatives for consideration during forthcoming Project phases that meet this NOAA Fisheries request.

Niles Dam

The proposed CER alternative does not provide for restoring the bankfull width, floodprone width, or natural bed elevation of the channel. An additional 66 ft of abutment and an additional 1.9 ft of bed elevation should be removed in order to restore the natural channel morphology and to reduce the potential for creating a fish passage barrier. SFPUC has advised the Consultant Team that there may be a practical limit to the extent of right abutment (adjacent to Niles Canyon Road) removal due to geotechnical and stability issues that were outside the scope of this Study and that will be addressed by SFPUC, as may be required, during final design.

As proposed in the CER, the alternative is a velocity barrier for discharges associated with the 2.0-year flow event, and is only marginally passable during the 1.5-year and 1.25-year flow events. There are velocity gradients through the notch in the dam would not exceed criteria for swimming speeds of adult steelhead during the 1.5-year and 1.25 year flows.

Niles dam should be lowered to elevation 108.4, which is the estimated historic pre-dam bed elevation and is 6.9 ft below the dam crest. The CER alternative suggests that the dam will be lowered approximately 5 ft, but no specific design elevation is cited. Therefore, the CER alternative does not meet the criteria for fish passage associated with lowering the dam crest to the pre-dam bed elevation. Lowering the dam crest to elevation 108.4 will return the channel to its original (pre-dam) elevation and grade, and to the native streambed material. Since there should be no dam crest remaining, there is no potential for a barrier to fish passage associated with crest exposure.

The bed elevation of 108.4 is based on a calculation of the natural bed slope through the Niles dam site using the available survey data collected by Trihey & Assoc. in 2000. The 1914 plans do not show the actual bed elevation, or the dam height above the channel bed, nor do the plans indicate the depth of the underlying foundation of the dam. The actual height of the dam, from crest to foundation, is not known and may not be 6.9 ft uniformly across the 60-foot opening. It is recommended that the entire height of the dam, even if it is greater than 6.9 ft, be removed. This will avoid leaving a potentially unstable section of the dam below grade that could later be dislodged by high flows.

The final dam crest lowering should be determined either prior to, or during actual demolition of the dam. The boundary distinguishing the foundation of the dam and the native bed material should be evident based on either visual observations or borings. The actual limits of the dam excavation could be set through pre-demolition surveys of the dam and channel. Drilled core samples through the dam at several locations will indicate the height of the dam and the location of native bed materials. These data should be used in the bid specifications to indicate the final extent of excavation so that the entire dam height is removed.

The Niles CER Dam Removal Alternative does not meet any key geomorphology and fish passage criteria (bankfull width, floodprone width, historic stream bed elevation, and passage velocity) established within this Study (Section 2.5). A Niles dam removal alternative (Study Alternative) has been provided within this Study (Figures 28 and 29) that meets all key criteria. However, other acceptable alternatives could likely be developed during final design that also meet the established criteria. While there are competing issues that will likely influence the Niles dam removal alternative that is selected during the EIR process; it is nevertheless recommended that the selected alternative meet the criteria established within this Study, especially in regards to fish passage which is one of the SFPUC stated Project objectives.

The March 16, 2004, NOAA Fisheries letter requested at Niles Dam that, *"... the left abutment be removed because this structure may continue to influence the stream channel during large channel forming flow events (i.e. mean annual flood events and above)."* This Study concurs with the NOAA Fisheries statement that the left abutment should be removed and has developed criteria and potential alternatives for consideration during the forthcoming EIR/Permitting process that meet this NOAA Fisheries request.

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FIGURES

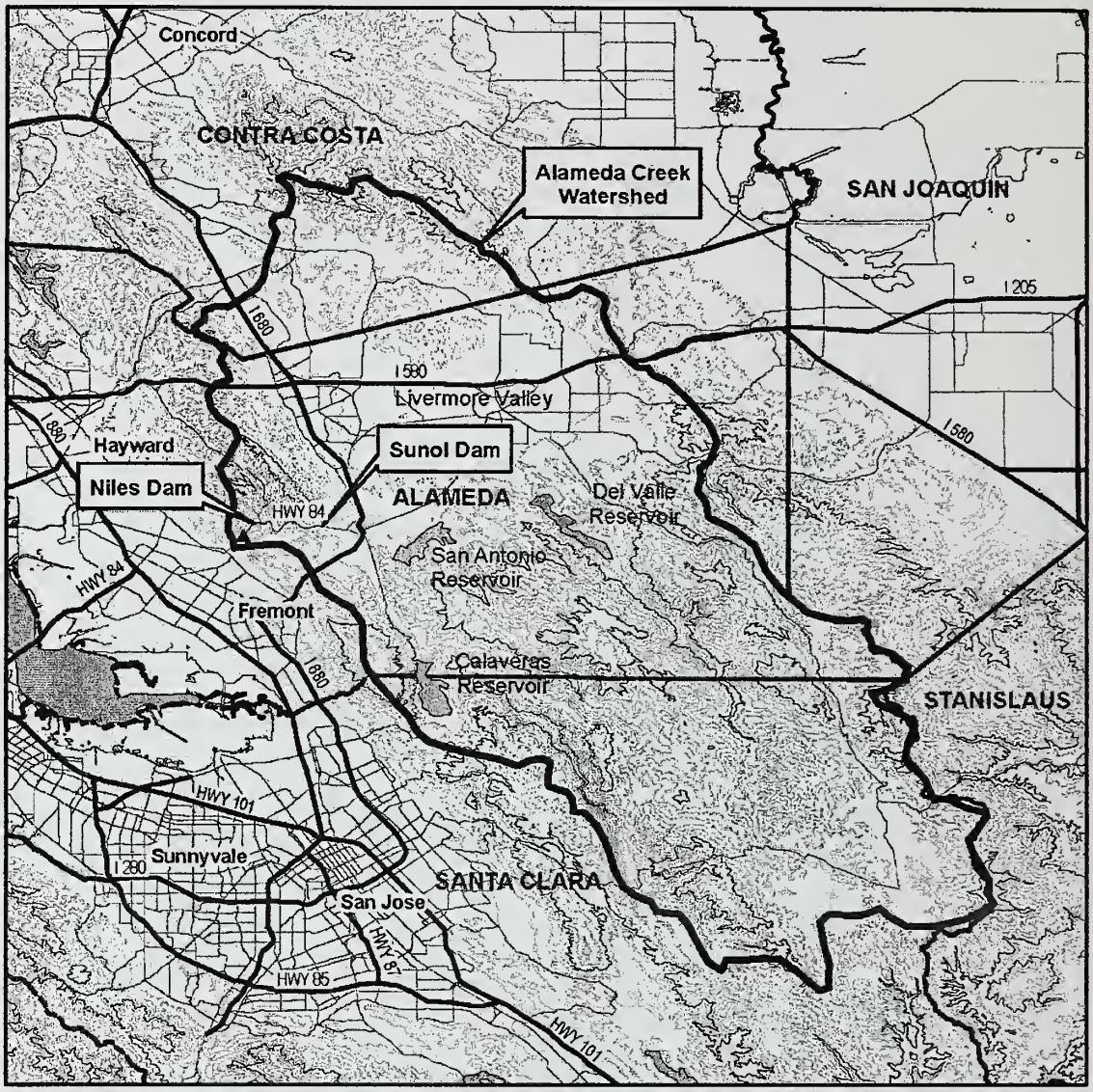


Figure 1. Map of Alameda Creek Watershed

Figure 2. Alameda Creek Geomorphic Study Area and Hydraulic Modeling Sites

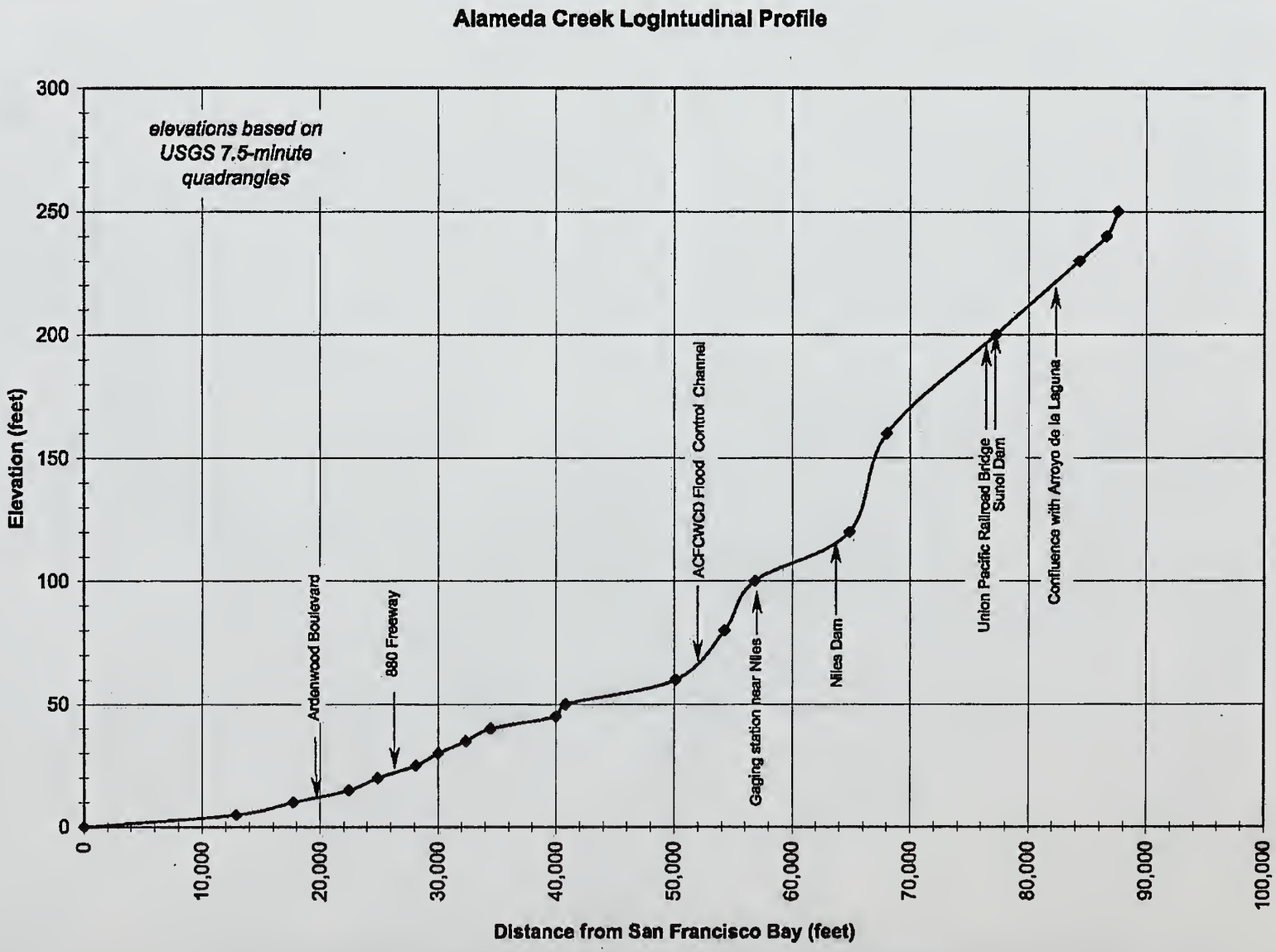
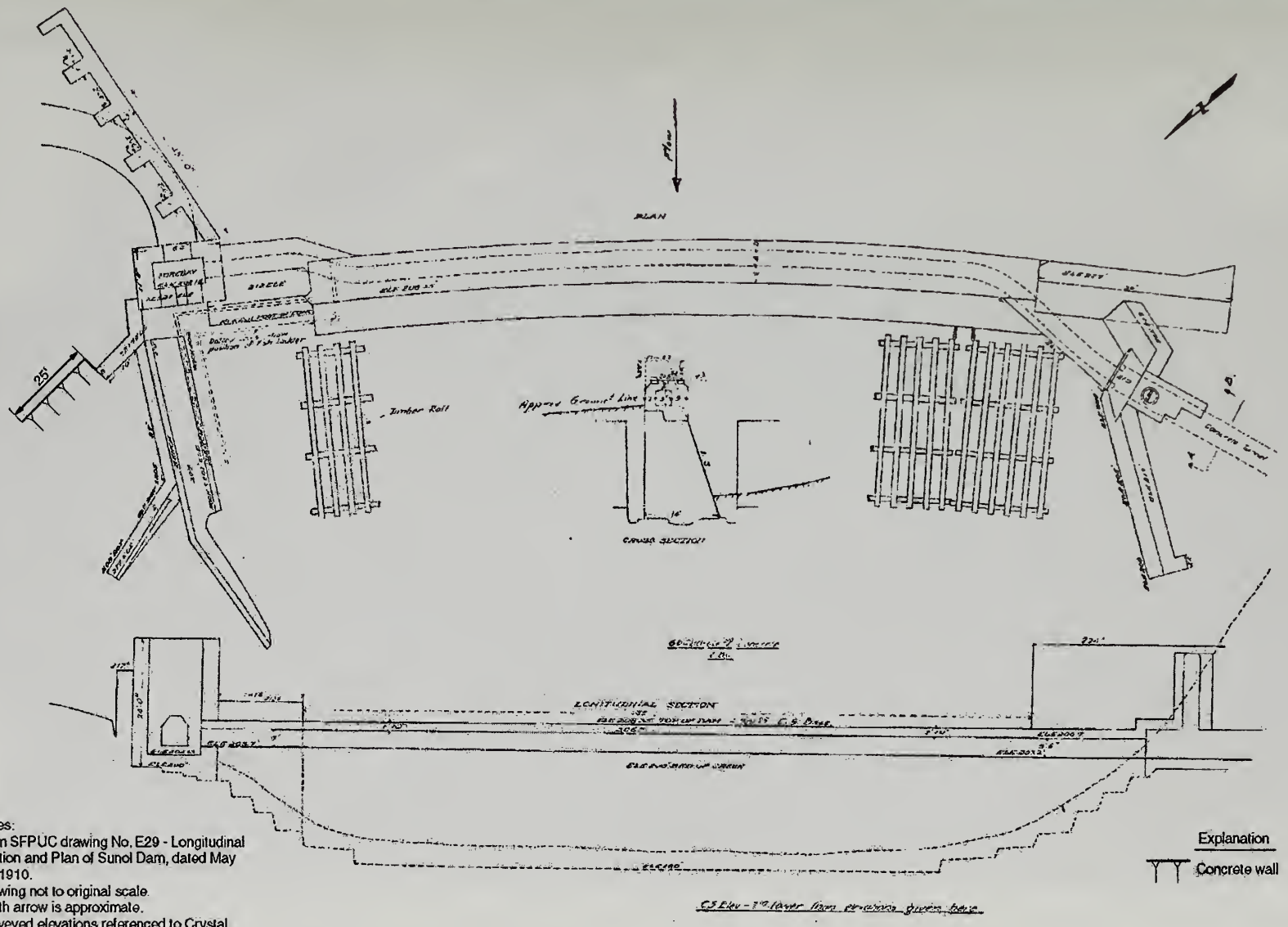


Figure 3. Alameda Creek - Longitudinal Profile



Notes:
1. From SFPUC drawing No. E29 - Longitudinal Section and Plan of Sunol Dam, dated May 25, 1910.
2. Drawing not to original scale.
3. North arrow is approximate.
4. Surveyed elevations referenced to Crystal Springs Datum (not NGVD 29/USGS)

Figure 4. Sunol Dam - Plan and Section (1910)

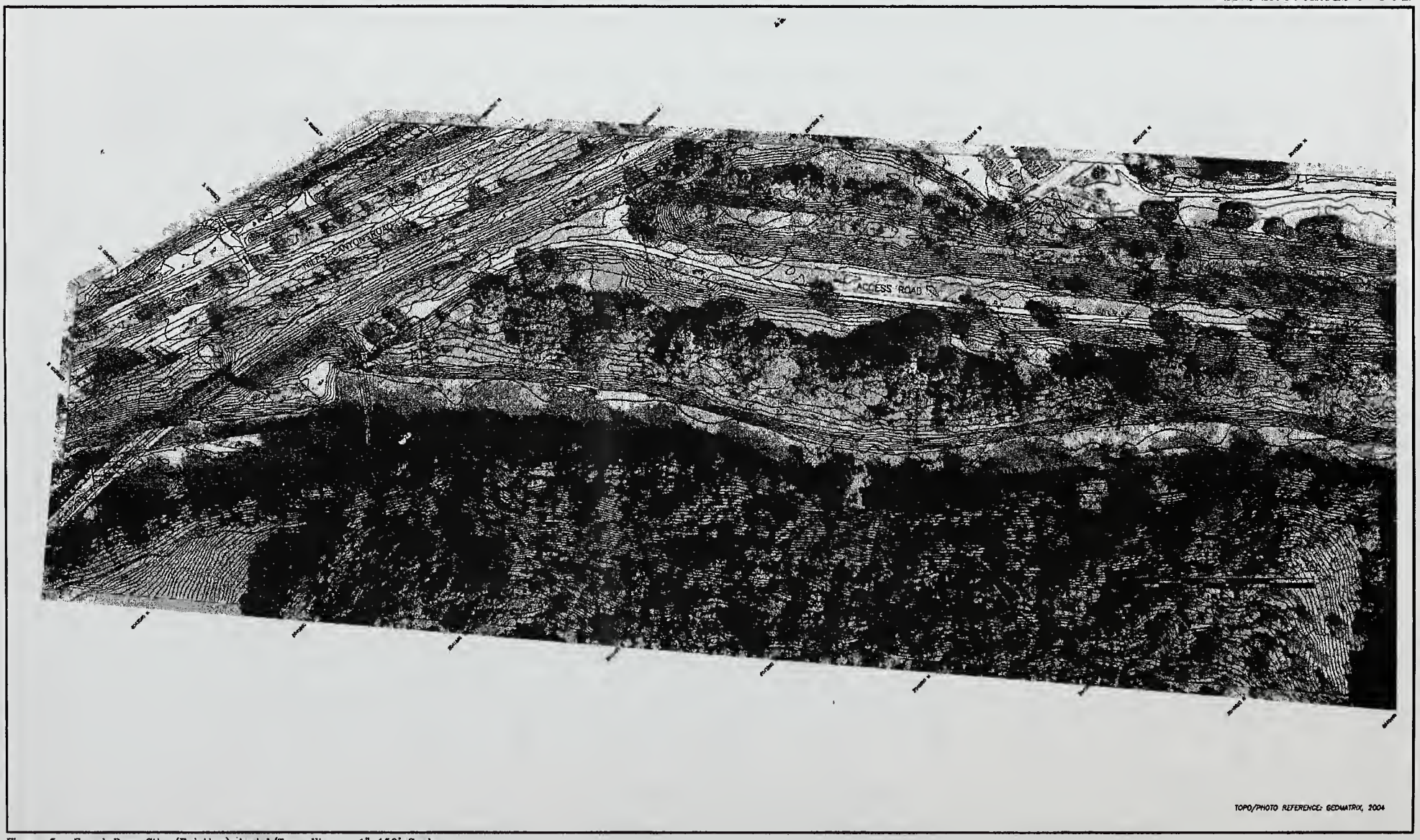


Figure 5. Sunol Dam Site (Existing) Aerial/Topo View – 1"=150' Scale

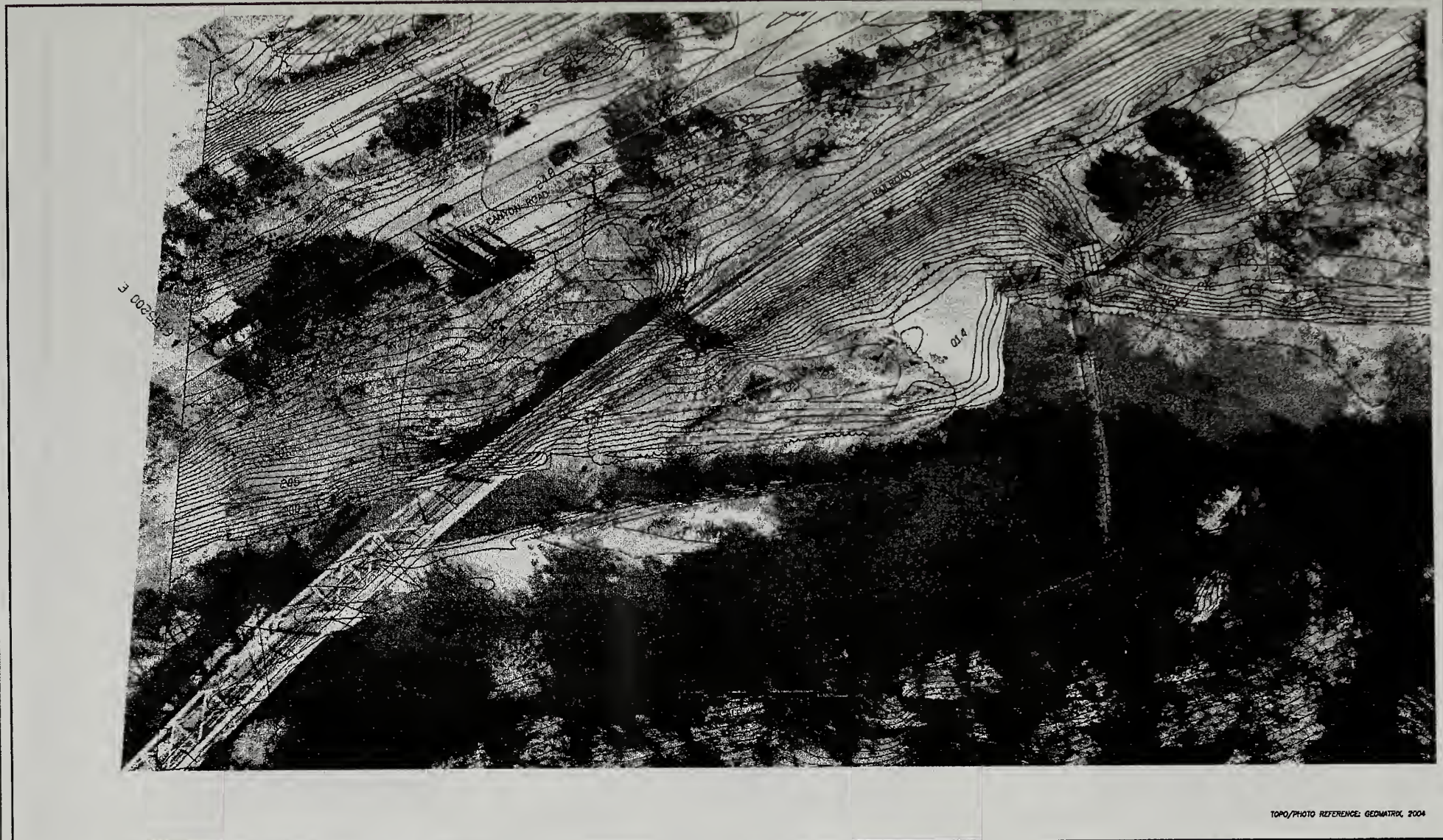


Figure 6 Sunol Dam Site (Existing) Aerial/Topo View – 1"=50' Scale

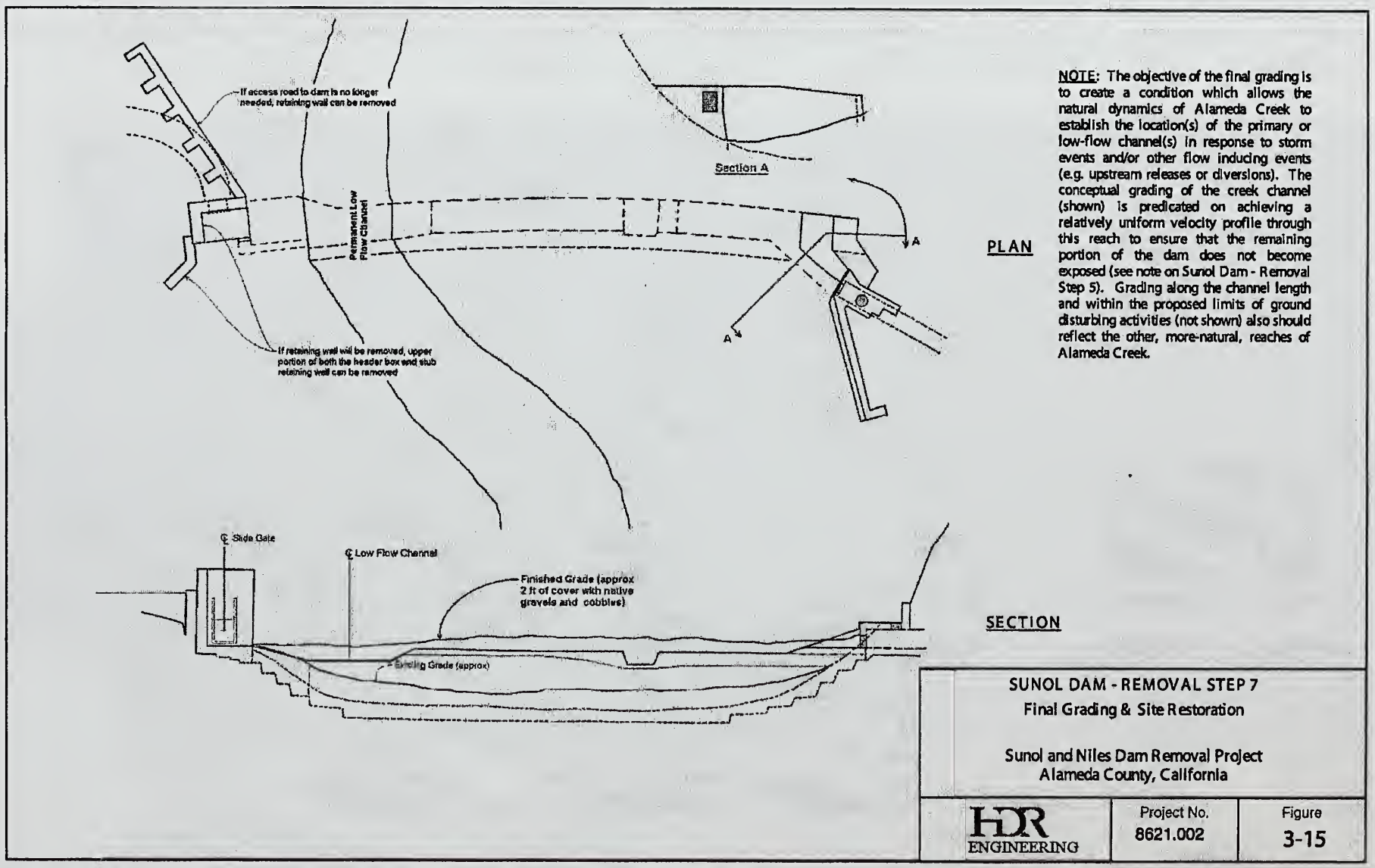

If access road to dam is no longer needed, retaining wall can be removed
Permanent Low Flow Channel
If retaining wall will be removed, upper portion of both the header box and stub retaining wall can be removed
Section A
A
A
PLAN
NOTE: The objective of the final grading is to create a condition which allows the natural dynamics of Alameda Creek to establish the location(s) of the primary or low-flow channel(s) in response to storm events and/or other flow inducing events (e.g. upstream releases or diversions). The conceptual grading of the creek channel (shown) is predicated on achieving a relatively uniform velocity profile through this reach to ensure that the remaining portion of the dam does not become exposed (see note on Sunol Dam - Removal Step 5). Grading along the channel length and within the proposed limits of ground disturbing activities (not shown) also should reflect the other, more-natural, reaches of Alameda Creek.
℄ Slide Gate
℄ Low Flow Channel
Finished Grade (approx 2 ft of cover with native gravels and cobbles)
Existing Grade (approx)
SECTION
SUNOL DAM - REMOVAL STEP 7
Final Grading & Site Restoration
Sunol and Niles Dam Removal Project
Alameda County, California
HDR ENGINEERING
Project No. 8621.002
Figure 3-15
Reference: Geomatrix, 2004

Figure 7. Sunol Dam Removal - Plan/Elevation (CER Alternative)

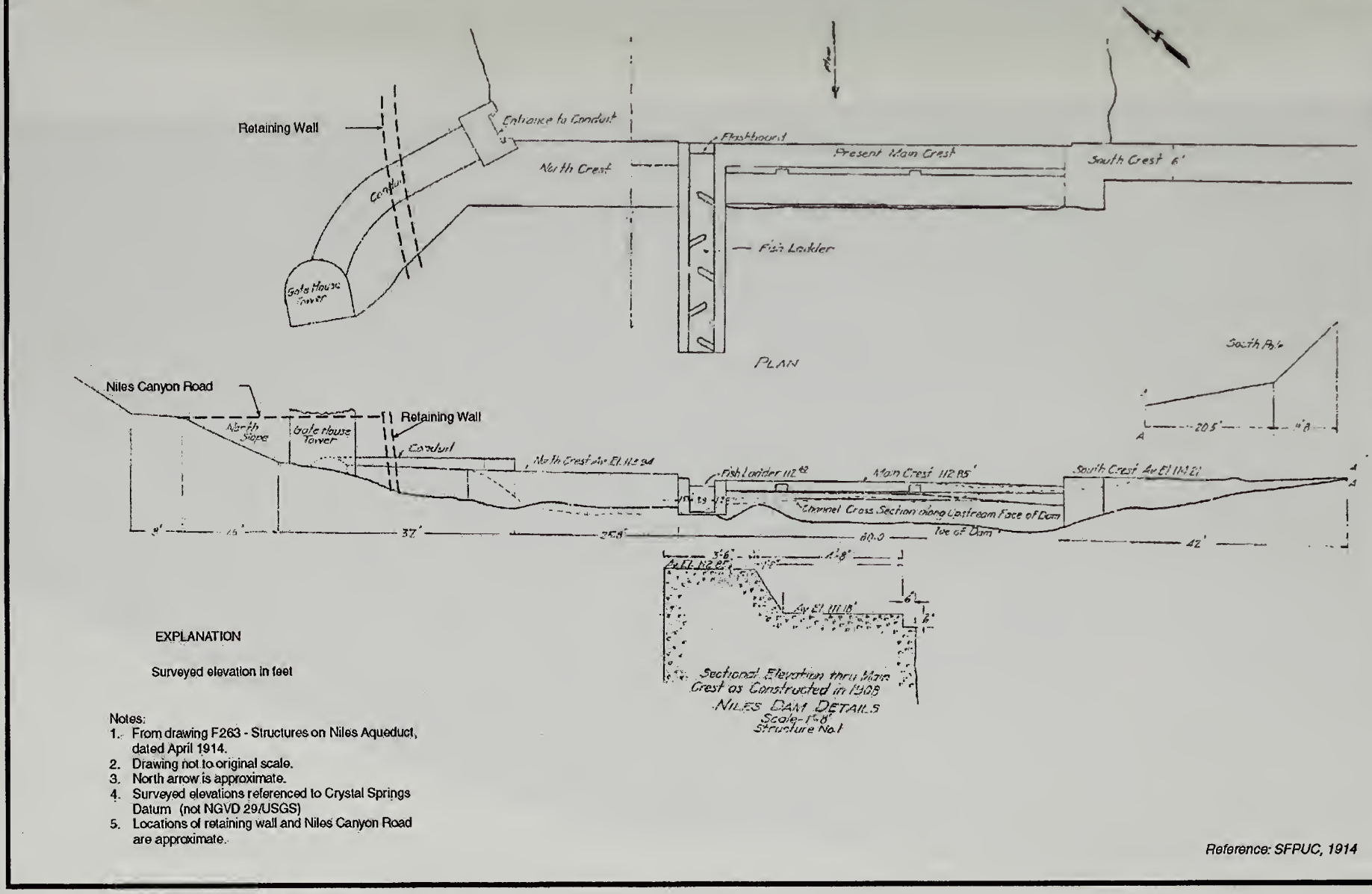


Figure 8. Niles Dam - Plan and Section View Drawing (1914)

Figure 8. Niles Dam Site (Existing) Aerial/Topo View – 1"=40' Scale

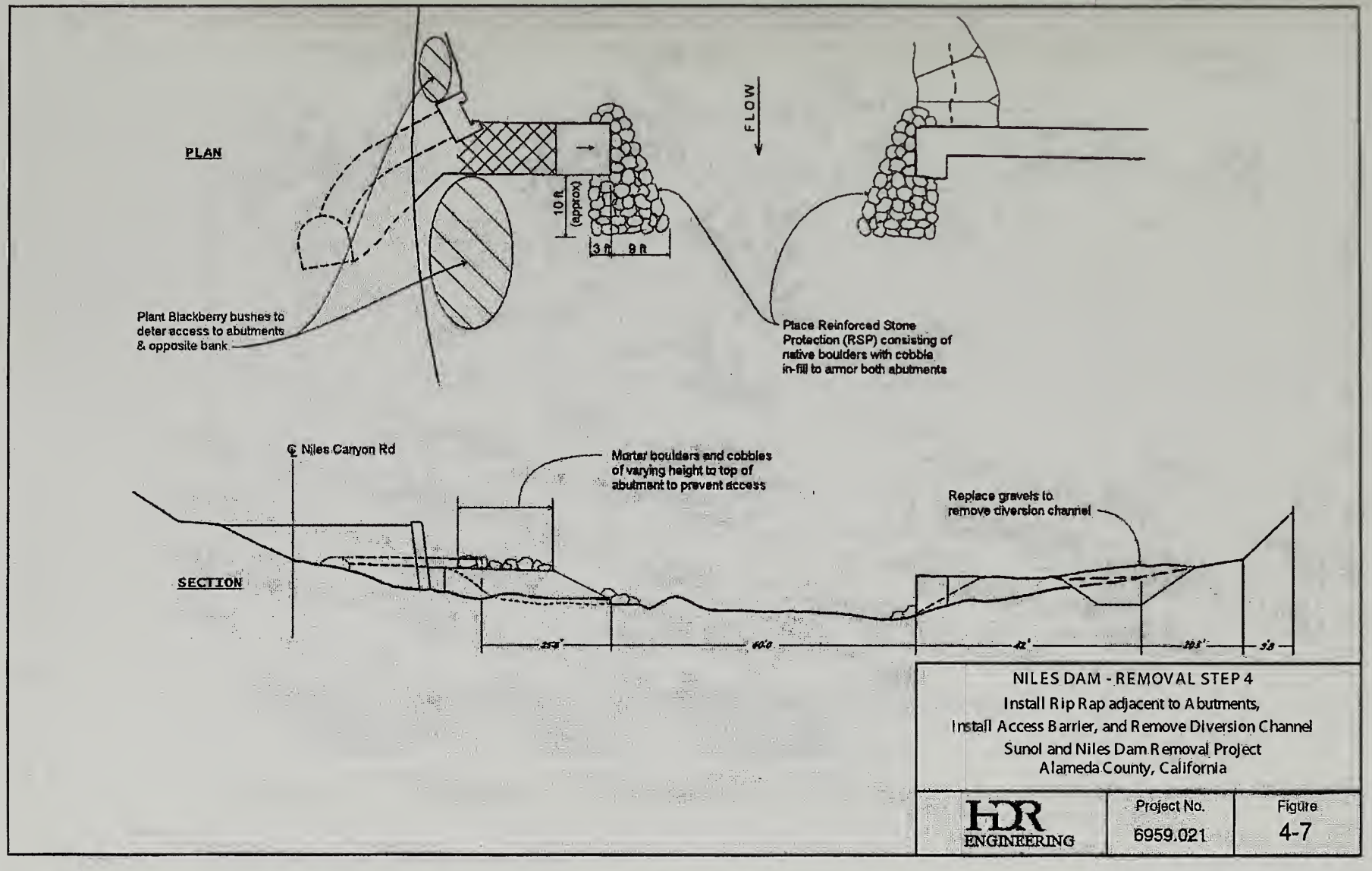

PLAN
FLOW
10 ft (approx)
3 ft
9 ft
Plant Blackberry bushes to deter access to abutments & opposite bank
Place Reinforced Stone Protection (RSP) consisting of native boulders with cobble in-fill to armor both abutments
℄ Niles Canyon Rd
Mortar boulders and cobbles of varying height to top of abutment to prevent access
Replace gravels to remove diversion channel
SECTION
NILES DAM - REMOVAL STEP 4
Install Rip Rap adjacent to Abutments,
Install Access Barrier, and Remove Diversion Channel
Sunol and Niles Dam Removal Project
Alameda County, California
HDR ENGINEERING
Project No.
6959.021
Figure
4-7

Figure 10. Niles Dam Removal - Plan/Elevation (CER Alternative)

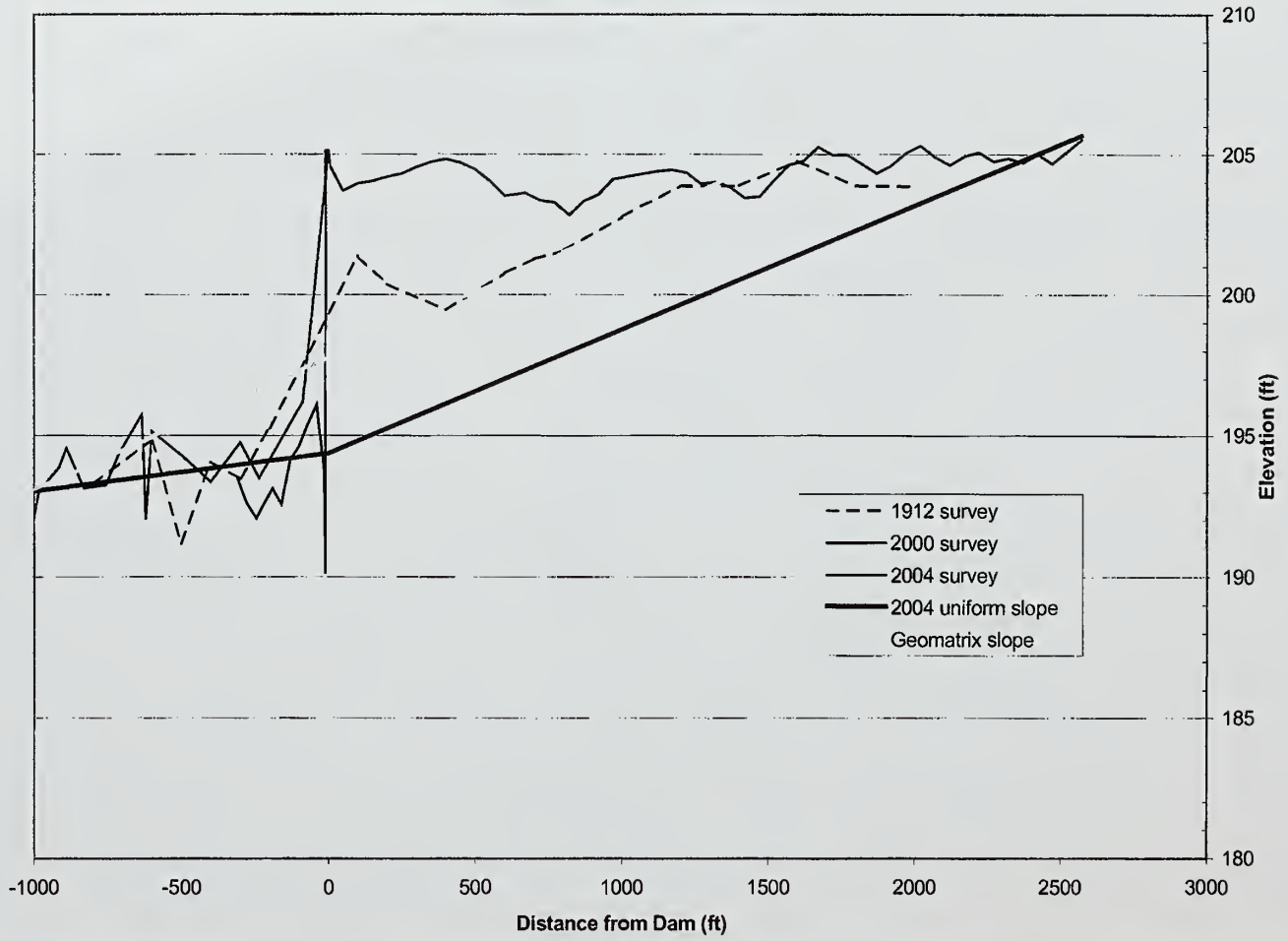


Figure 11. Geomatrix (2004) and Revised Natural Bed Slope (2004 Uniform Slope) Through Sunol Dam

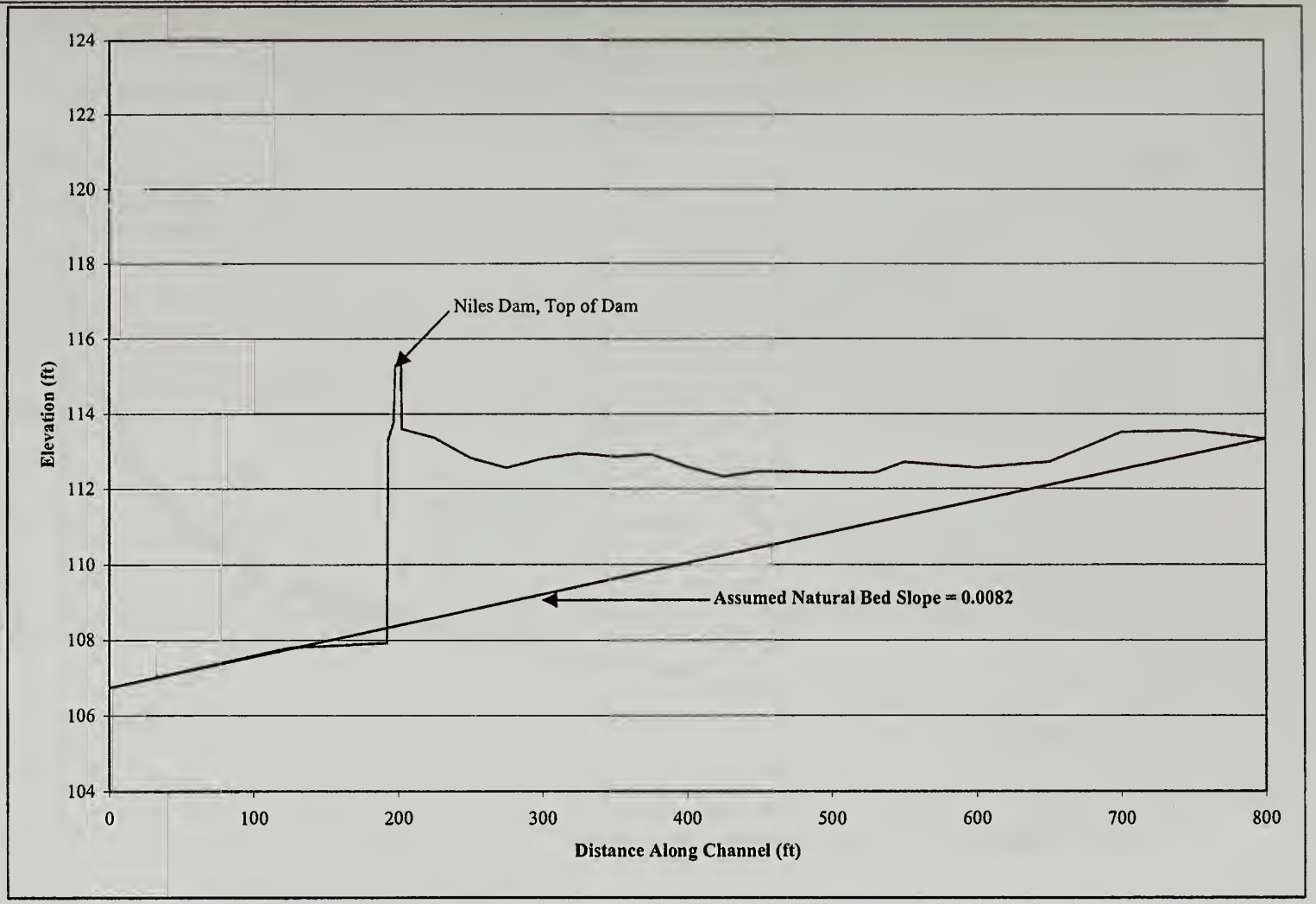


Figure 12. Natural Bed Slope Through Niles Dam

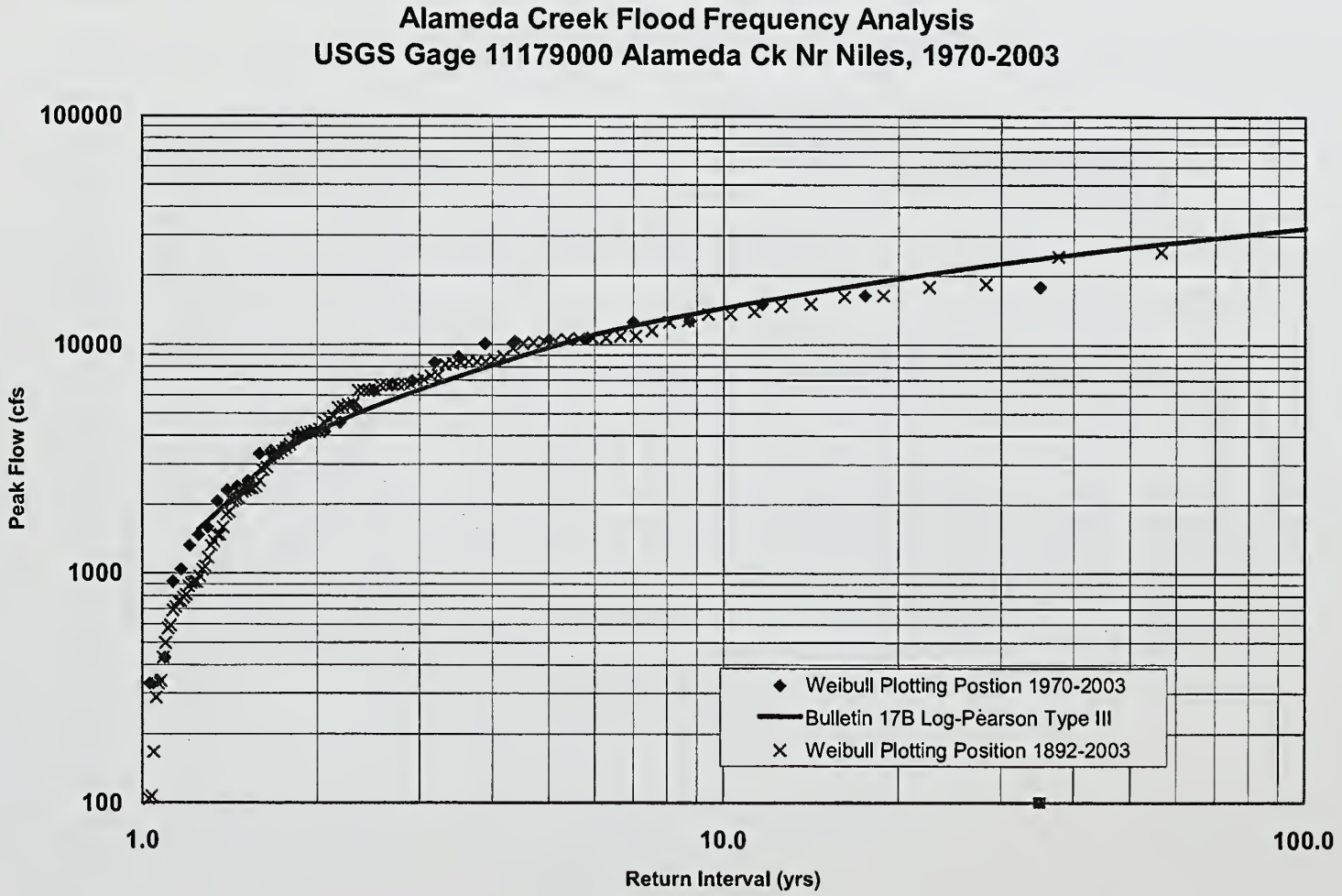


Figure 13. Alameda Creek Flood Frequency Analysis

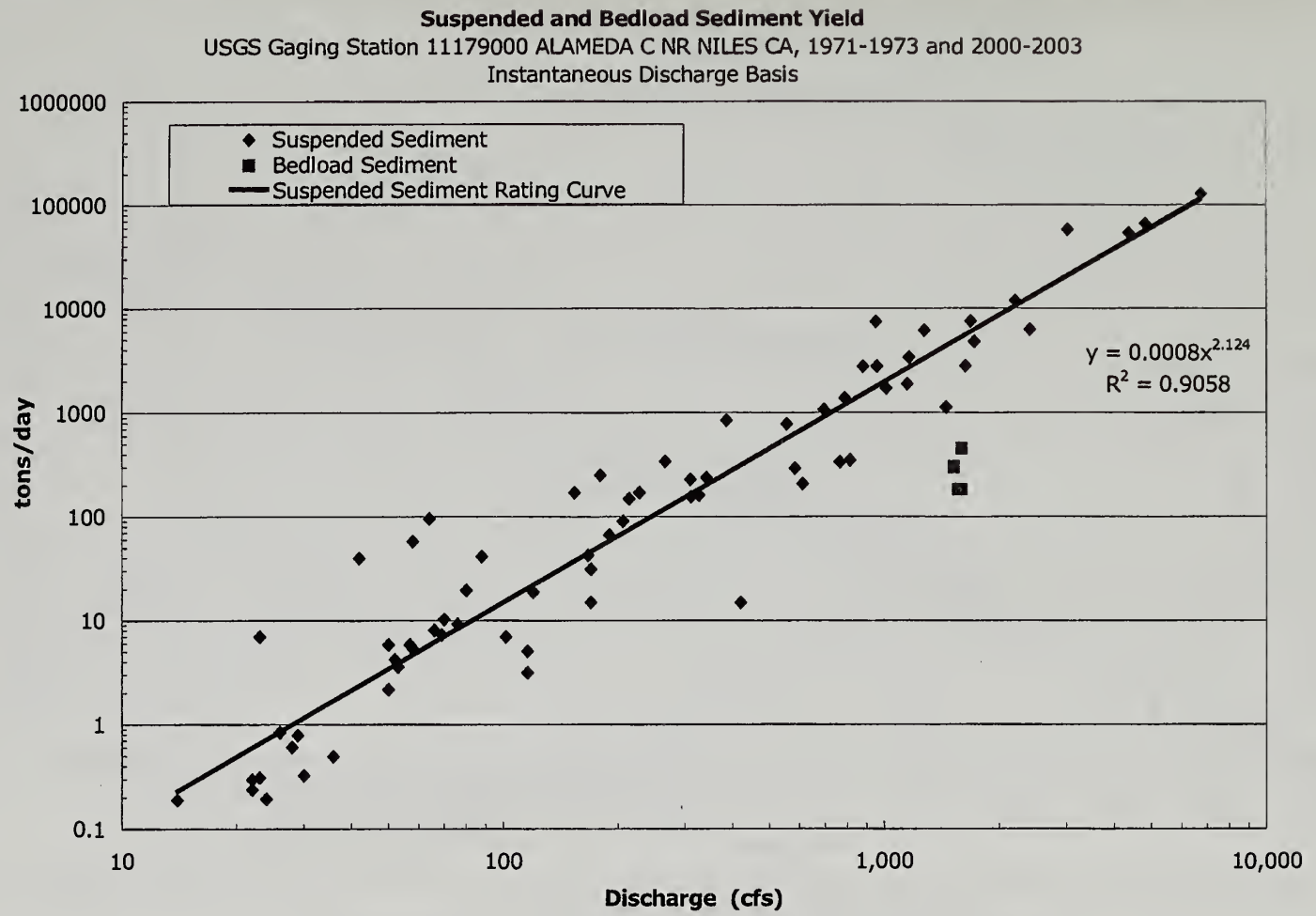


Figure 14. Suspended and Bedload Sediment Yield at Niles Gaging Station, Instantaneous Discharge Basis

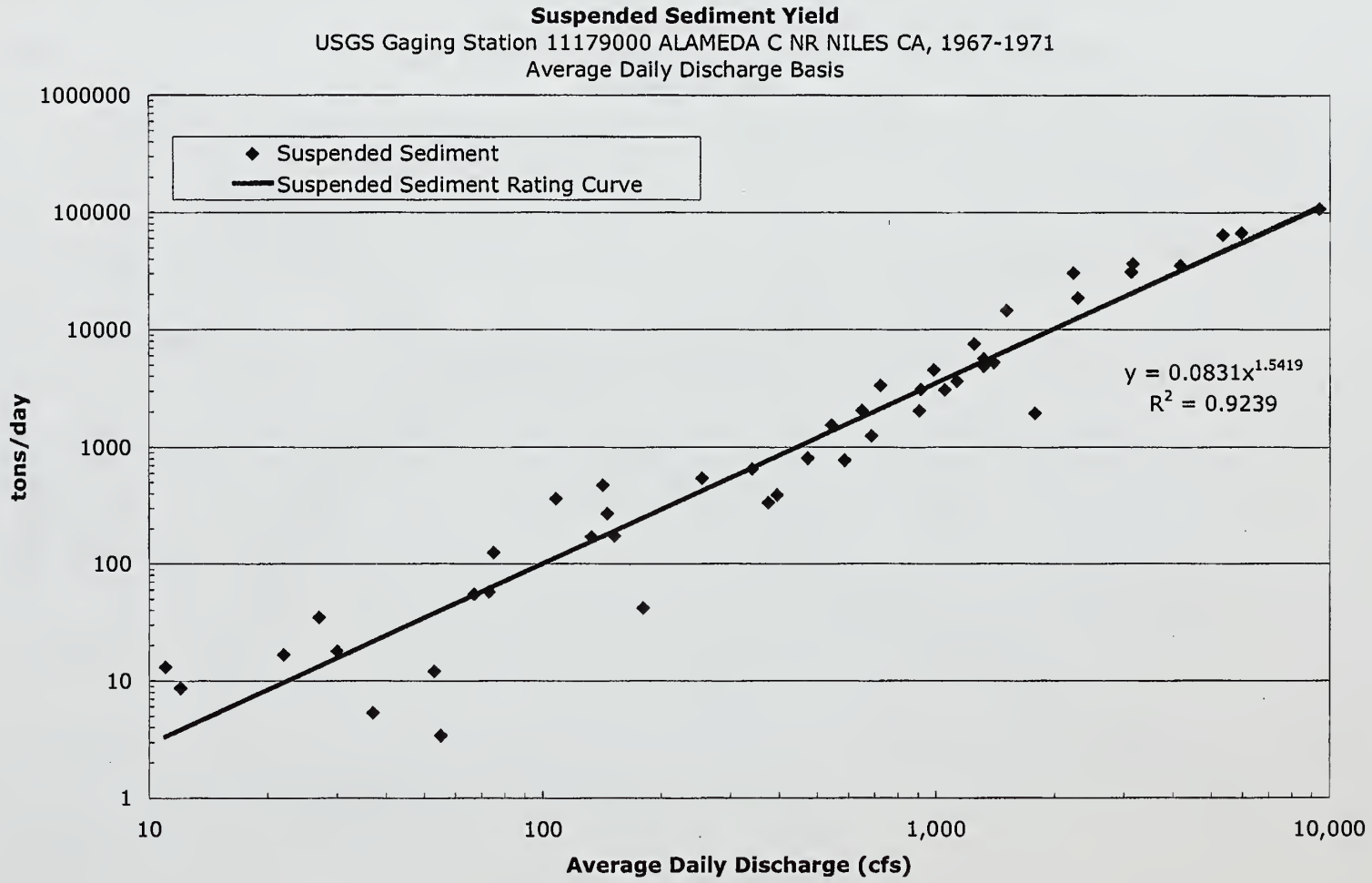


Figure 15. Suspended and Bedload Sediment Yield at Niles Gaging Station, Average Daily Discharge Basis

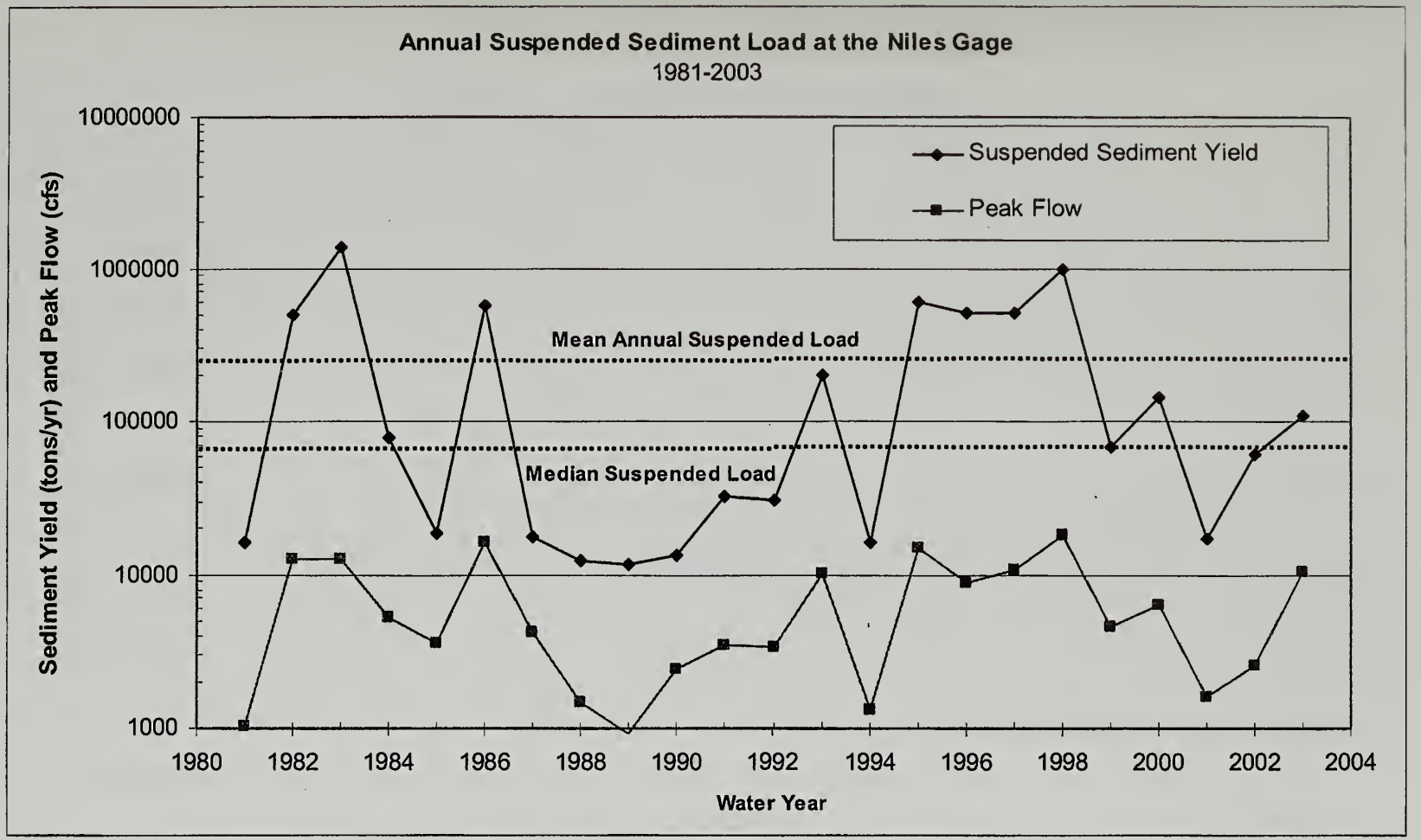


Figure 16. Annual Suspended Sediment Load at Niles Gage

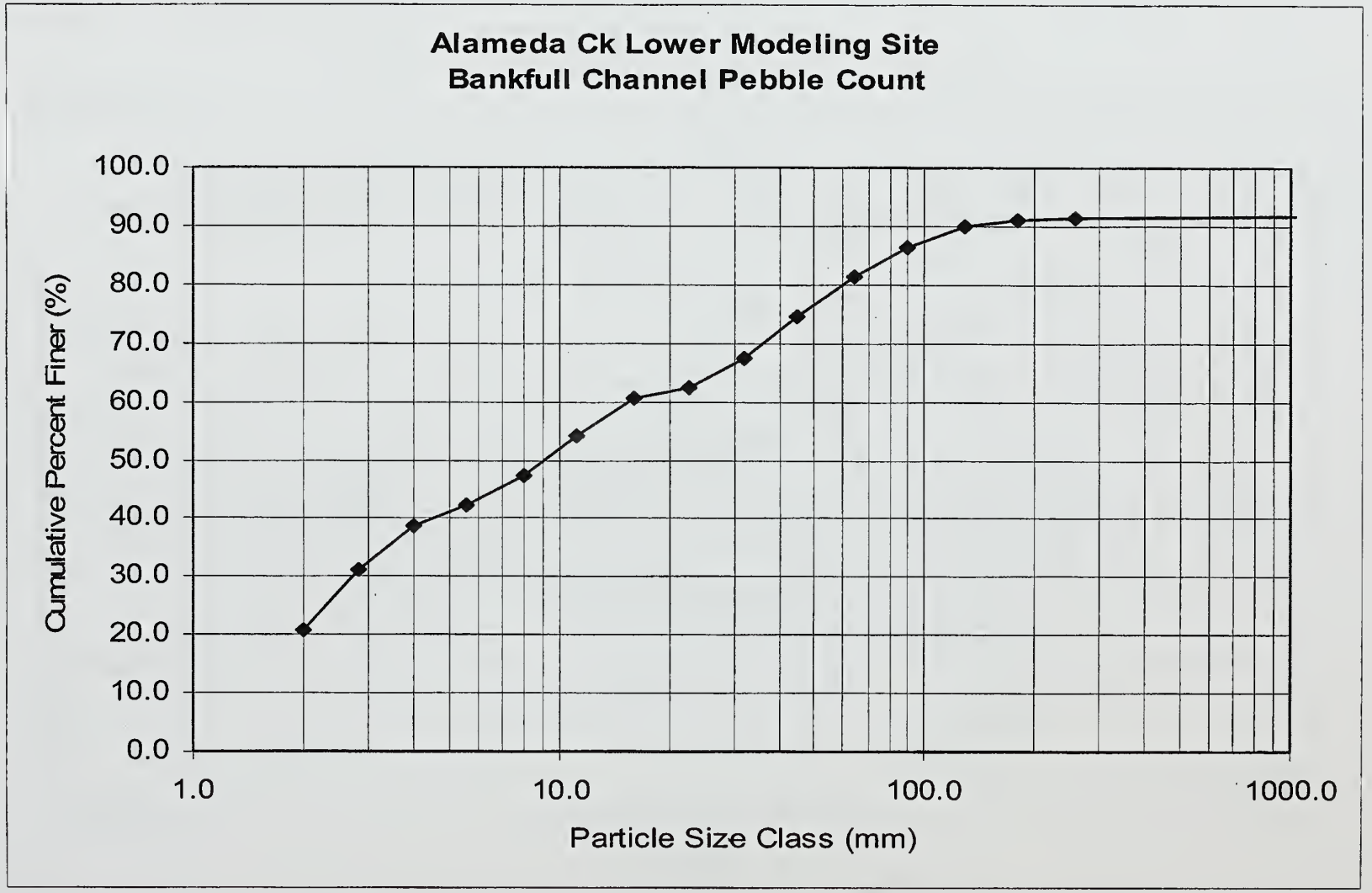


Figure 17. Particle Size Distribution in Bankfull Channel Alameda Creek, Lower Hydraulic Modeling Site

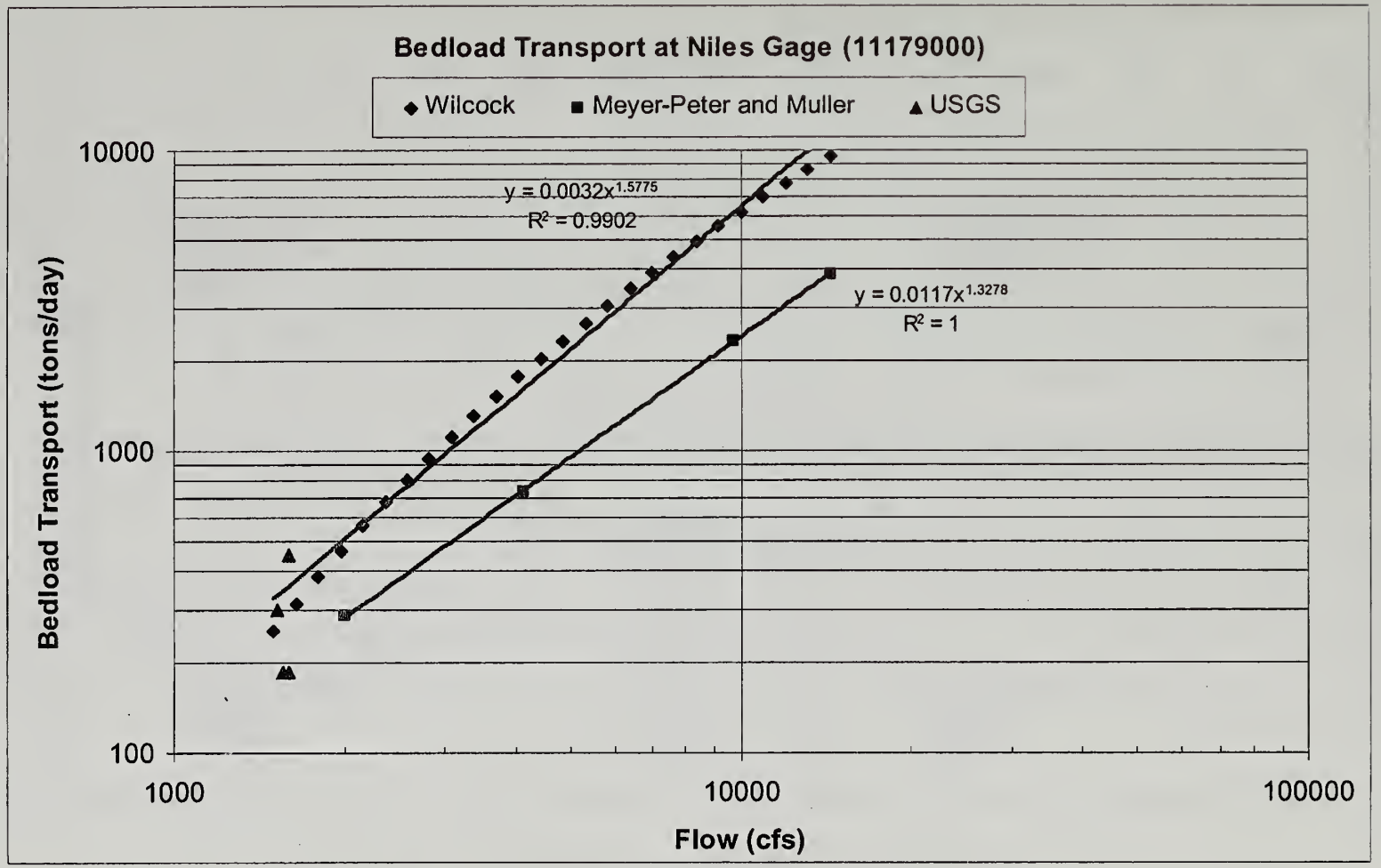


Figure 18. Bedload Transport Rates for Alameda Creek Based on Wilcock and Meyer-Peter and Muller

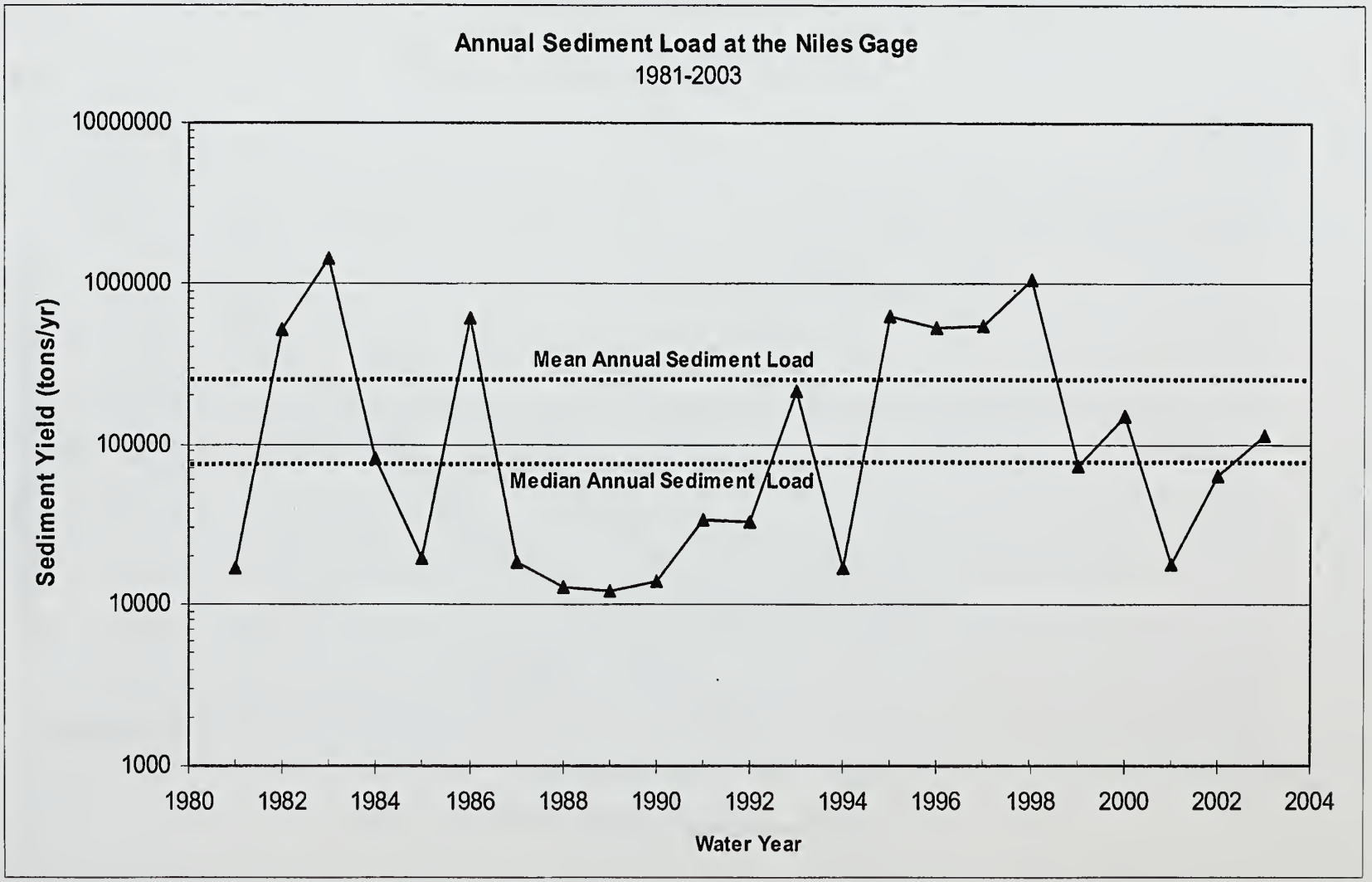


Figure 19. Annual Sediment Load at the Niles Gage

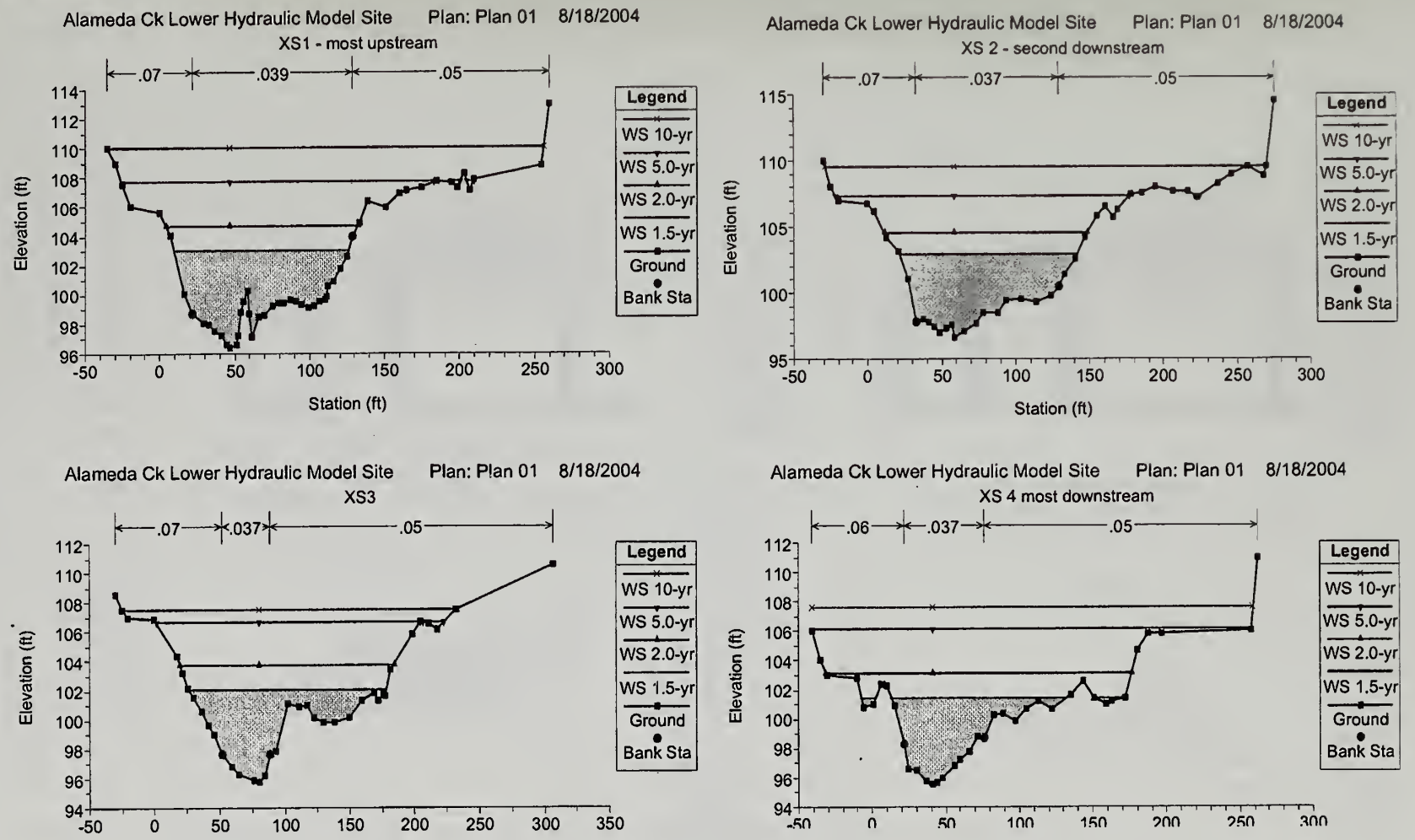


Figure 20. Stage-Discharge Flood Profiles for Lower Hydraulic Model Site

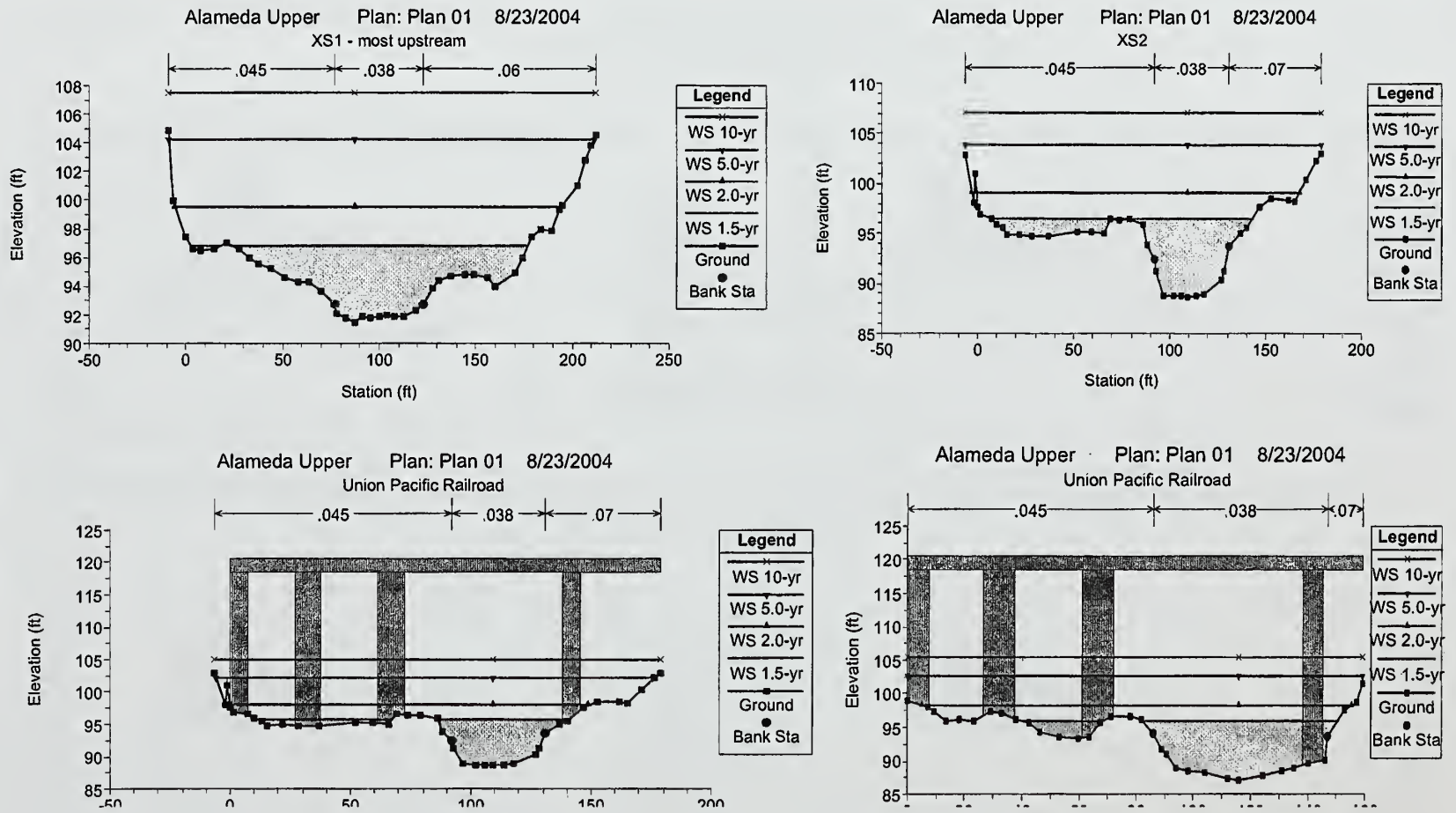


Figure 21. Stage-Discharge Flood Profiles for Upper Hydraulic Modeling Site (cross-sections 1 & 2)

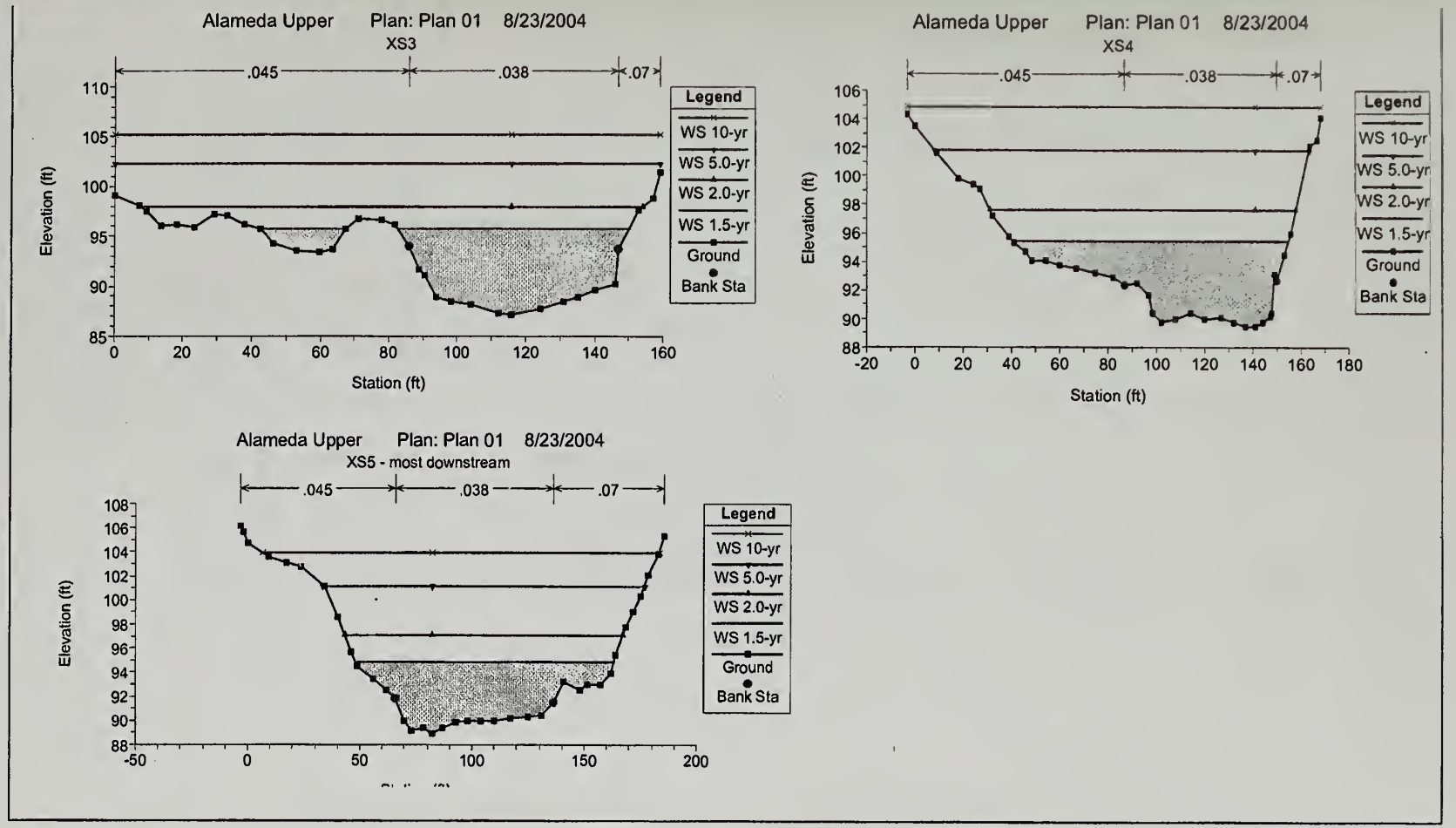


Figure 22. Stage-Discharge Flood Profiles for Upper Hydraulic Modeling Site (cross-sections 3, 4, & 5)

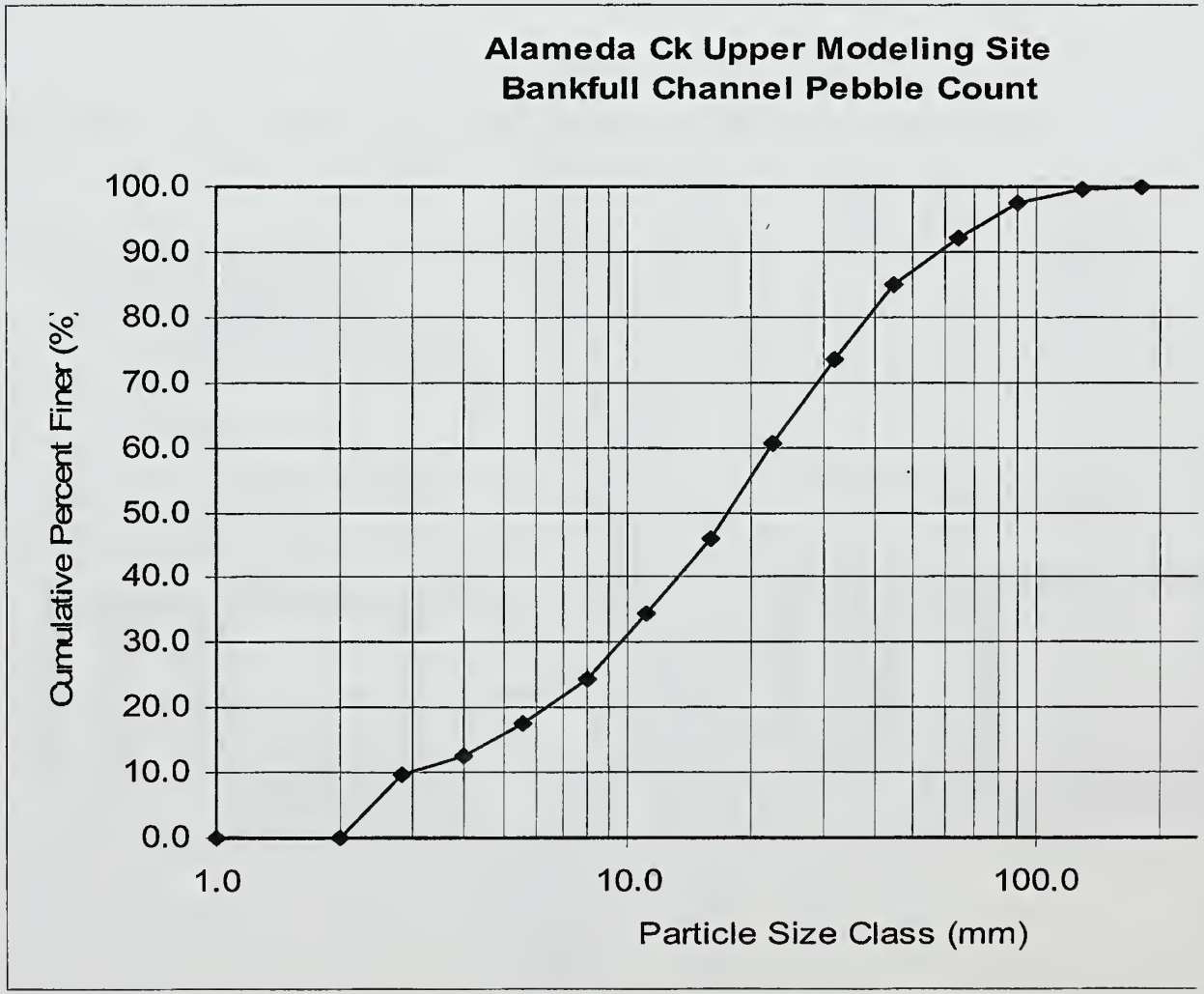


Figure 23. Particle Size Distribution Curve for Bankfull Channel, Upper Hydraulic Modeling Site

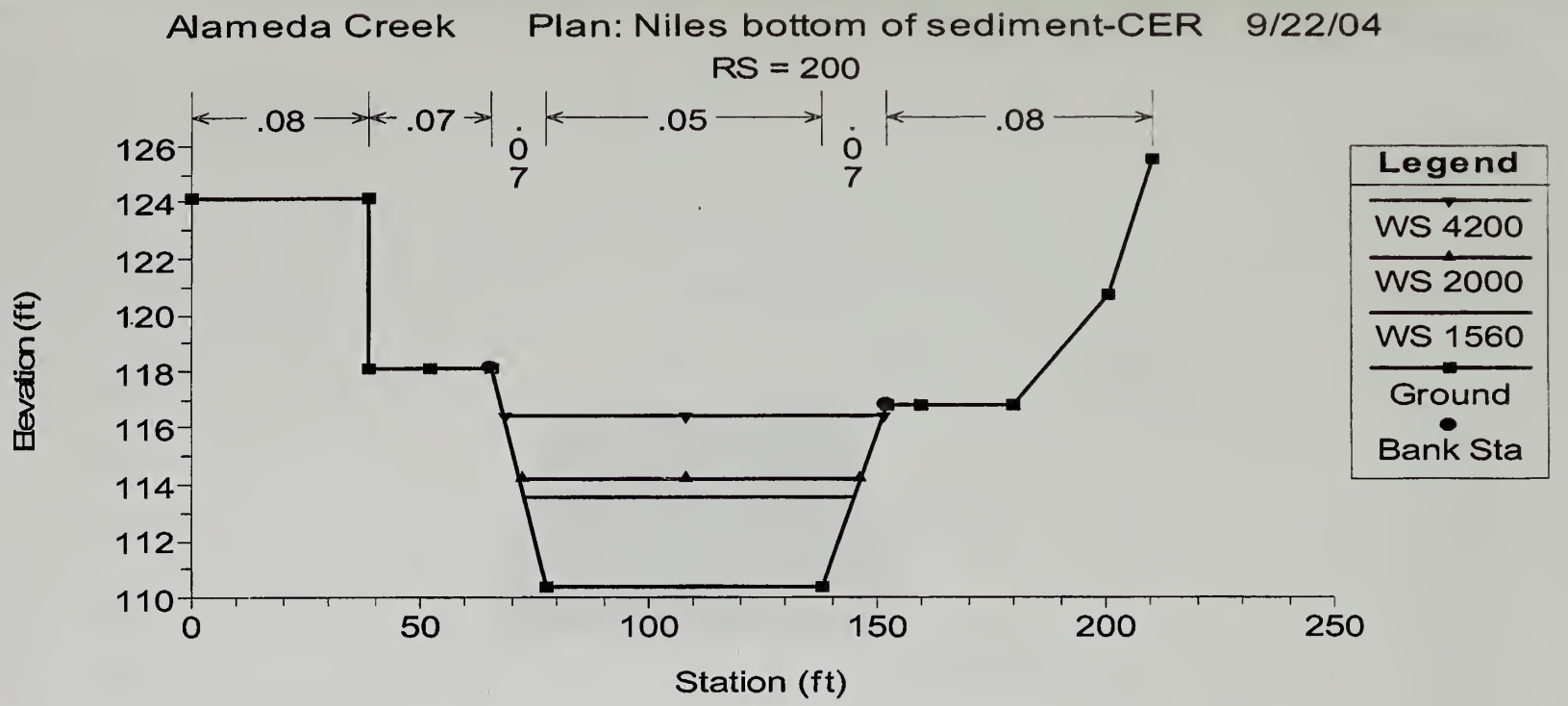


Figure 24. Water Surface Elevation at Niles Dam for the CER Alternative

Note: Vertical scale is exaggerated relative to horizontal scale. Cross Section is looking upstream.

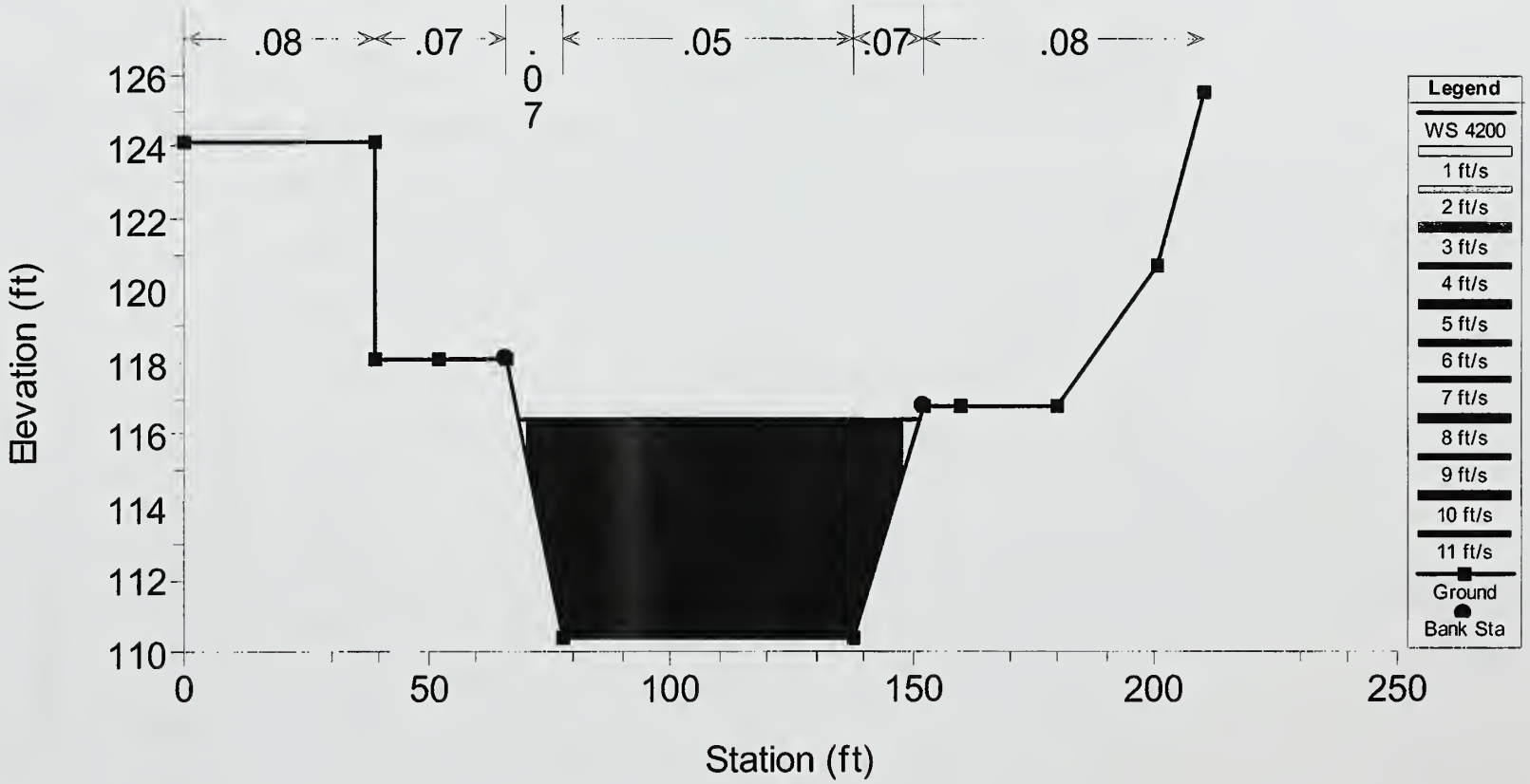


Figure 25. Velocity Distribution at Niles Dam for the CER Alternative (2-year flow of 4,200 cfs)

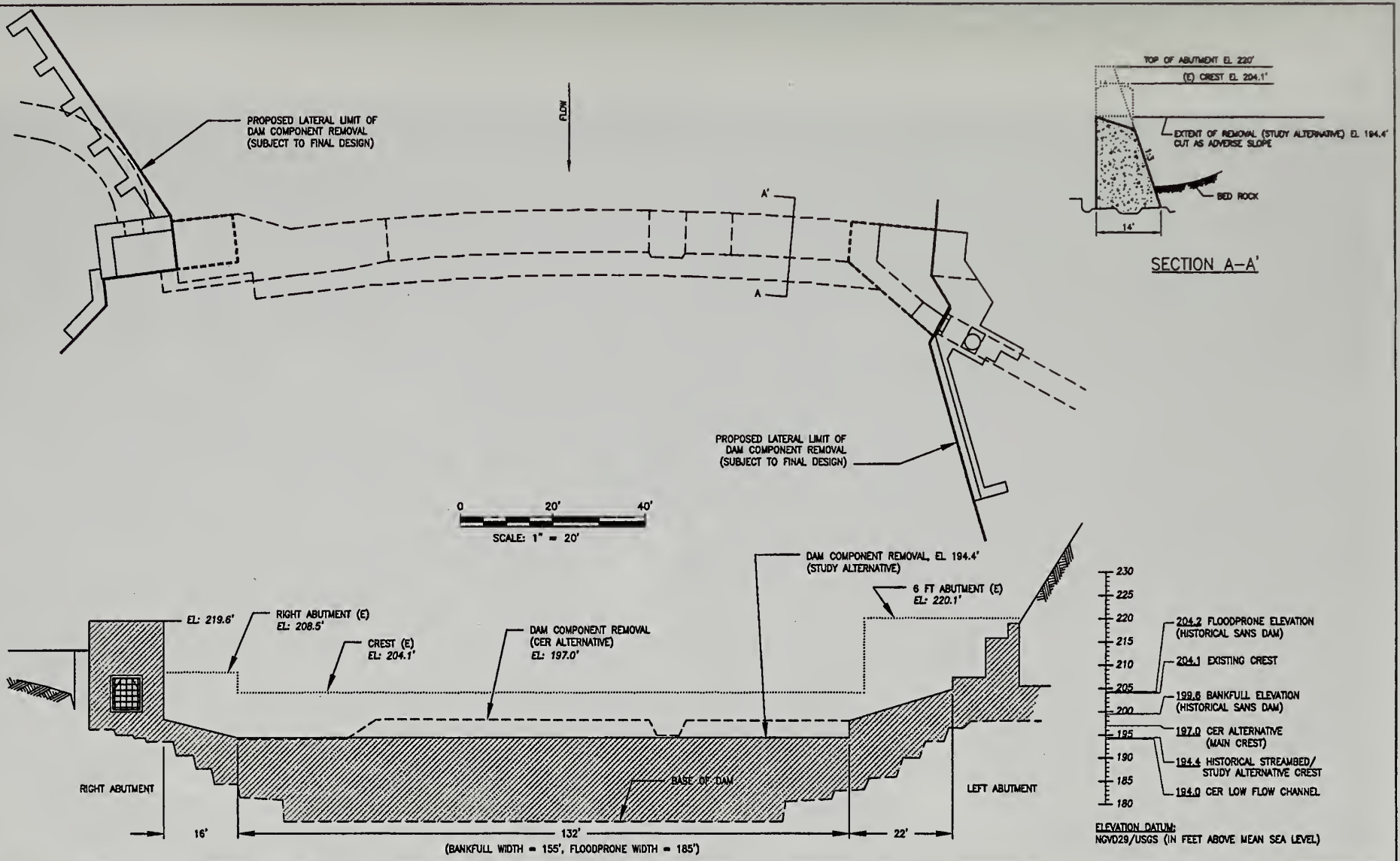


Figure 28. Sunol Dam Removal – Plan/Elevation (Study Alternative)

Figure 27. Sunol Dam Removal Aerial/Topo View (Study Alternative)

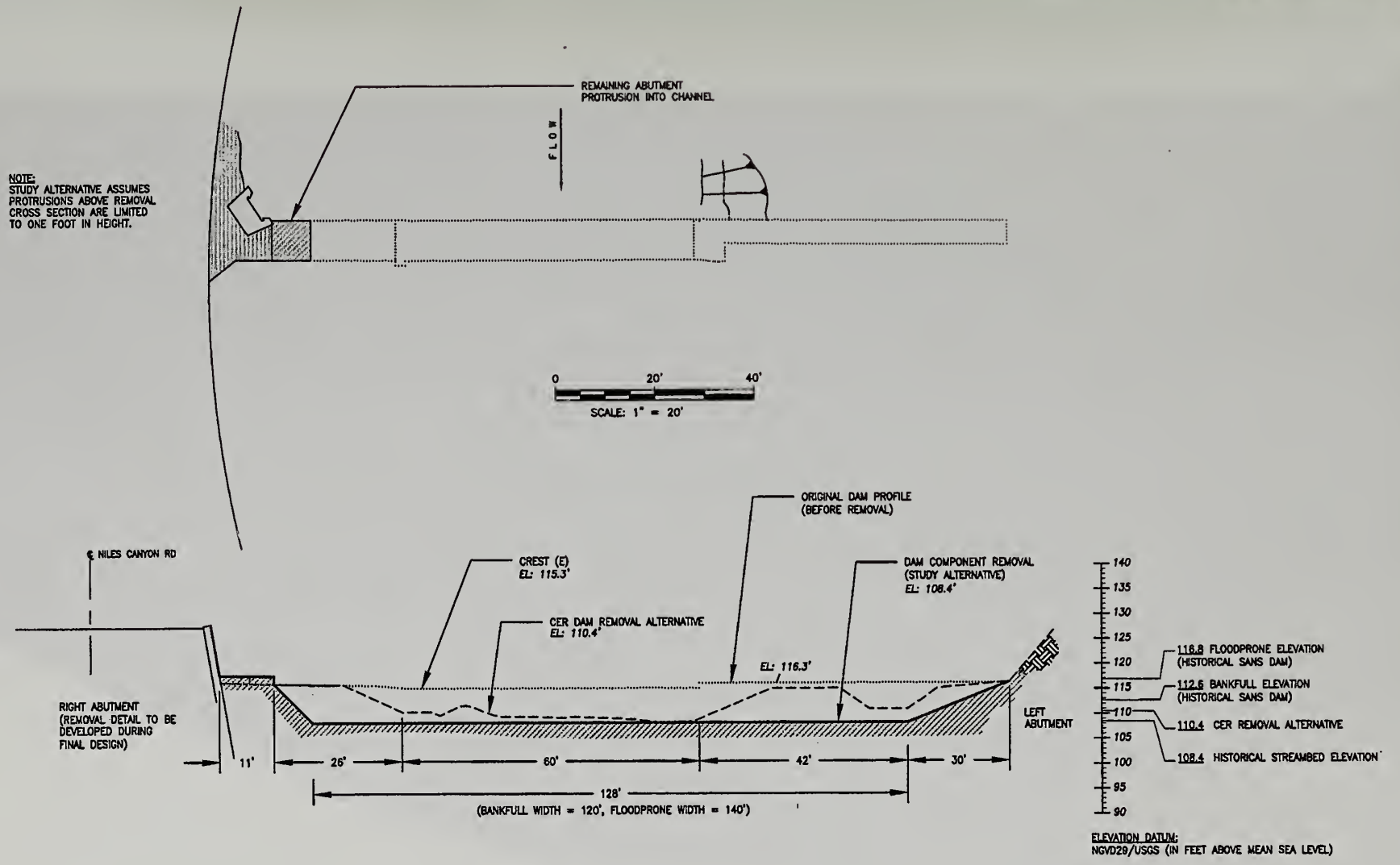


Figure 28 Niles Dam Removal – Plan/Elevation (Study Alternative)

Figure 29. Niles Dam Removal – Aerial/Topo View (Study Alternative)

PHOTOGRAPHS

Photo 1. Moderately entrenched reach located 2,000 ft downstream from Sunol Dam (view from left to right bank). Middle ground of photo is within the bankfull width of the channel, and the tape is at approximately the floodprone elevation. The person is standing within the floodplain. Niles Canyon Rd is just visible in the background.

Photo 2. Alternate bars at station 8822, located upstream from Niles Dam (view downstream). Dominant particle size on the bars is gravel, mixed with sand.

Photo 3. Sand and gravel deposition on the floodplain at station 14,100 (view upstream). Channel is near top right of photo.

Photo 4. Sand deposits on the floodplain. Note woody debris trash lines (behind survey rod) piled against the trees that are indicative of past high flows.

Photo 5. Lower Hydraulic Modeling Site. Sediment deposition within the bankfull channel and on the floodplain (begins at left margin of photo) at the lower hydraulic modeling site.

Photo 6. Upper hydraulic model site (view upstream to Sunol Dam). Bar on right side of photo is predominantly sand, mixed with gravels and cobble. The top of the bar at its outsdie edge where it meets the toe of the adjacent hillslope defines the bankfull width of the channel.

APPENDIX A

STUDY TEAM

STUDY TEAM

Table 1 presents the Study Team for the Channel Geomorphology Study, Niles and Sunol Dam Removal Project. The composition of the Study Team varied (added or change in level of participation) as the Study progressed. Only key organizations and members that participated are presented. This table was periodically updated during the course of the Study as organizations, members, roles, or contact information changed.

Table 1. Study Team Members and Agencies

Person	Contact	Role
Consultant Team		
Mitchell Katzel (Entrix)	707 833 2687 mkatzel@entrix.com	Lead Geomorphologist
Tom Taylor (Entrix)	916 386 3828 ttaylor@entrix.com	Fisheries Issues Support
Paul Wisheropp (Entrix)	916 923 1097 pwisheropp@entrix.com	Hydraulic Issues Support
Toby Leung (Weiss)	510 450 6124 tjl@weiss.com	Engineering Support
Jerry McHugh (Weiss)	510 450 6145 jm@weiss.com	Consultant Team (Weiss/Entrix) Project Manager
Other Consultants		
Vick Germany (ESA)	415 962 8415 vgermany@esassoc.com	Consultant Project Manager for EIR
Pete Hudson (ESA)	phudson@esassoc.com	Consultant EIR Hydrogeologist
Todd Crampton (Geomatrix)	510 663 4100 tcrampton@geomatrix.com	Consultants Conceptual Engineering Report (CER) Project Manager
Jim Watson (HDR)	510 302 2341 jim.watson@hdrinc.com	Consultant CER Lead Engineer

Person	Contact	Role
City and County of San Francisco		
Steve Apperson (LRMS)	sapperson@sfwater.org	Watershed Hydrologist, SFPUC
Jane Lavelle (Planning)	415 934 5708 jlavelle@sfwater.org	Policy oversight in Alameda Creek, SFPUC
Barbara Palacios (PMB)	415 554 0718 bpalacios@sfwater.org	Sunol/Niles Dam Removal Project Manager, SFPUC
Anna Roche (Planning)	415 551 4560 aroch@sfwater.org	Environmental Project Manager, SFPUC
Brian Sak (WQB)	925 862 5734 bsak@sfwater.org	Fish Biologist for Alameda Watershed, SFPUC
Rick Cooper (MEA)	415 558 5974 rick.cooper@sfgov.org	Lead Agency Representative, Planning Department
Diana Sokolove (MEA)	415 558 5971 diana.sokolove@sfgov.org	Lead Agency Representative, Planning Department
Joshua Milstein	joshua.d.milstein@sfgov.org	Legal Counsel, City Attorney's Office
Romeo Rombawa	415 551 4870 rrombawa@sfwater.org	Engineering Design Bureau lead
Joseph Buitrago	415 551 4862 jbuitrago@sfwater.org	Engineering Design Bureau support
Joanne Wilson (LRMS)	650 652 3205 jwilson@sfwater.org	Watershed Projects Coordinator, SFPUC
NOAA Fisheries		
Gary Stern	707 575 6060 gary.stern@noaa.gov	NOAA Lead Contact
Brian Clure	brian.clure@noaa.gov	Technical Support - Geomorphology
Jonathon Mann	707 575 6054 jonathon.mann@noaa.gov	Technical Support – Fish Passage
Erik Schmidt	707 575 6083 erik.schmidt@noaa.gov	Technical Support
California Department of Fish and Game		

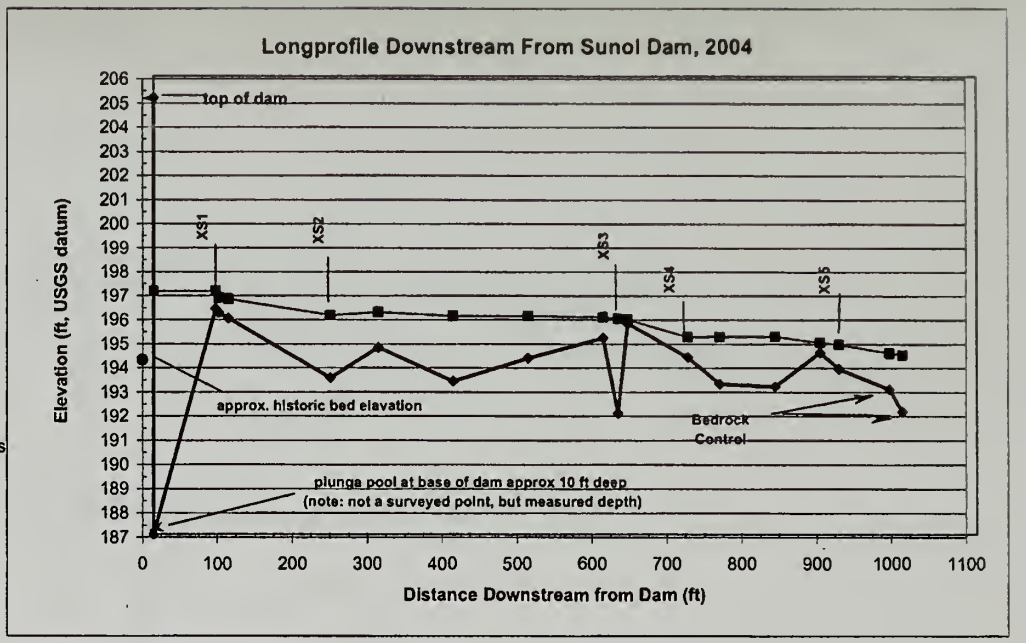
Person	Contact	Role
Kristine Atkinson	831 427 2638 katkinson@dfg.ca.gov	CDFG Lead Contact
Marcin Whitman	916 4454 3832 mwhitman@dfg.ca.gov	Technical Support
Alameda County Flood Control and Water Conservation District		
Laura Kidd	510 670-6478 laura@acpwa.org	ACFCWCD Point-of-Contact (Maternity Leave)
Richard Wetzig	510 670 5702 rickw@acpwa.org	ACFCWCD Point-of-Contact
Elisa C. Gill	510 670 5435 elisag@acpwa.org	Engineer-Scientist
Carla Schultheis	510 670 5576 carla@acpwa.org	Associate Engineer-Scientist
Mebrahtu Gebre-Kidan.	(510) 670 5520 mebrahtu@acpwa.org	Maintenance and Operations
Laurel Collins (Watershed Sciences)	510 524 8204 collins@lmi.net	Consultant Fluvial Geomorphologist for ACFCWCD
USACE		
Molly Martindale	molly.martindale@spd02.usace.army.mil	Permitting Agency
RWQCB		
Ann Riley	alr@rb2.swrcb.ca.gov 1515 Clay Street Suite 1400 Oakland, CA 94612	Permitting Agency

APPENDIX B

LONGITUDINAL PROFILE AND CROSS SECTIONS OF UPPER HYDRAULIC MODELING SITE

2004 Longprofile Data downstream from Sunol Dam
USGS datum

Station	Thalweg Ground Elev.	WSEL	
1000	192.07	194.41	bedrock control
983	193	194.5	bedrock control
915	193.85	194.86	XS5
890	194.53	194.94	
830	193.11	195.19	
756	193.22	195.18	
713	194.32	195.16	XS4
633	195.73	195.89	
620	192.01	195.93	XS3
600	195.13	195.99	
500	194.29	196.04	
400	193.33	196.04	
300	194.73	196.19	
236	193.47	196.07	XS2
100	195.94	196.74	
87	196.17	196.79	
83	196.34	197.07	XS1
0	187	197.07	bottom of plunge pool, measured depth, not s
0	205.1		top of dam



Appendix B - October 2004

XS1 Sta 0+83

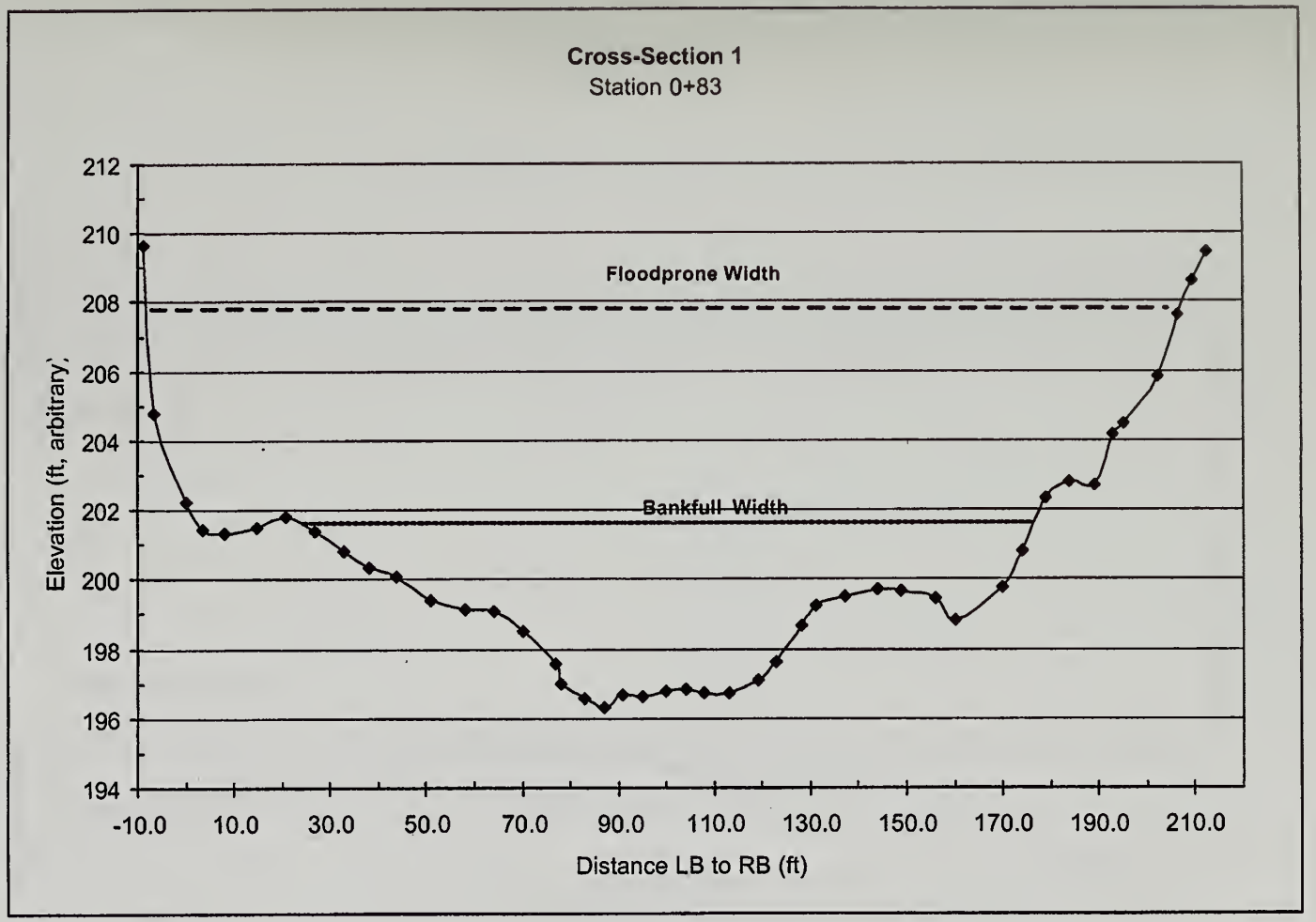
Upper Hydraulic Modeling Site Approx Station 83

This is the most upstream XS

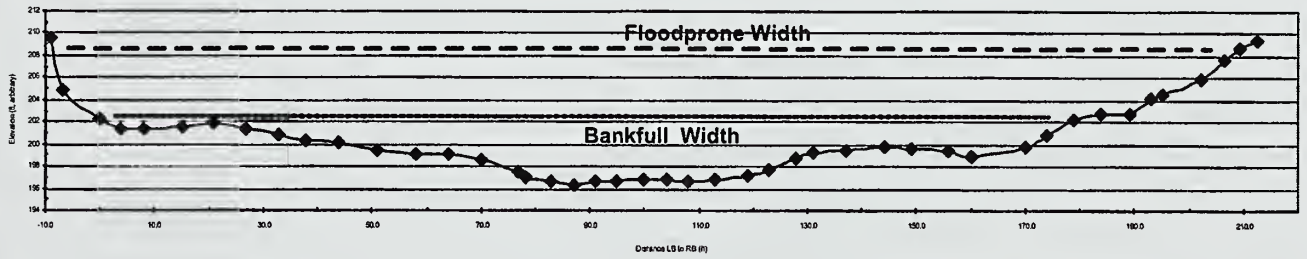
9-Aug-04

Station	BS	HI	FS	Elev	Notes	Dist LB to RB	convert to USGS Elevation
						-6.9	209.84
	5.39	105.39		100	Sharpie on LB dam abutment	-6.8	204.8
			5.22	100.17	Top Dam upstream; Top of Dam shot at 5th knob (bolt) from LB dam abutment	0.0	202.22
			6.04	99.35	Top Dam downstream lip	3.7	201.41
-6.9			5.41	99.98	LB	8.0	201.3
-6.9			0.57	104.82		16.0	201.48
0.0			7.99	97.40	Base LBHP	21.0	201.91
0.0			7.29	98.10	Top LBHP	27.0	201.4
3.7			9.90	98.59	cobble	33.0	200.75
8.0			8.91	98.48	cobble	38.0	200.33
15.0			9.75	96.94	cobble	44.0	200.09
21.0			9.40	96.99	cobble	51.0	199.41
27.0			9.81	98.59	cobble	58.0	199.11
33.0			9.43	95.99	cobble	64.0	199.09
38.0			9.89	95.51	cobble	70.0	198.5
44.0			10.15	95.24	cobble	77.0	197.54
51.0			10.90	94.59	cobble	78.2	199.98
58.0			11.10	94.29	cobble	83.0	199.55
64.0			11.12	94.27	small willow	87.0	196.29
70.0			11.71	93.68		91.0	198.59
77.0			12.97	92.72		95.0	198.63
78.2		105.39	13.25	92.14	LEW	100.0	196.75
83.0		109.39	13.89	91.73		104.0	198.81
87.0			13.92	91.47	thalweg	108.0	196.7
91.0			13.53	91.58		113.0	198.71
95.0			13.58	91.91		119.0	197.09
100.0			13.46	91.93		123.0	197.59
104.0			13.40	91.99		128.0	198.68
108.0			13.51	91.98		131.0	199.21
113.0			13.50	91.89		137.0	199.48
119.0			13.13	92.26	REW	144.0	199.68
123.0			12.62	92.77		149.0	199.69
128.0			11.53	93.86		158.0	199.49
131.0			11.00	94.39		160.0	198.81
137.0			10.73	94.89		170.0	199.73
144.0			10.53	94.89		174.0	200.79
149.0			10.55	94.84		179.0	202.3
158.0			10.75	94.64		184.0	202.9
160.0			11.40	93.99		189.0	202.99
170.0			10.49	94.81		193.0	204.15
174.0			9.43	95.99	Bank Full?	195.1	204.47
179.0			7.91	97.49	Denso Veg.	202.4	205.81
184.0			7.41	97.89	Denso Veg.	208.4	207.53
189.0			7.55	97.84	Denso Veg.	209.4	206.81
193.0			8.09	99.33		212.4	209.41
195.1			5.74	99.89	Base RBHP	220.0	
195.1			5.39	100.00	Top RBHP		
202.4			4.40	100.89			
208.4			2.59	102.81			
209.4			1.80	103.79			
212.4			0.90	104.69			
220.0					Base RR Gredo rip rap + another 20' @ 45' to 0 RR tracks		
		105.39					
0.0			7.29	98.10	Top LBHP XS1		
	2.49	100.59		98.1	move instrument - Top LBHP XS1		
		100.59	1.57	99.02	Top LBHP XS2		

Use 99.02 as elevation for XS2 top LBHP

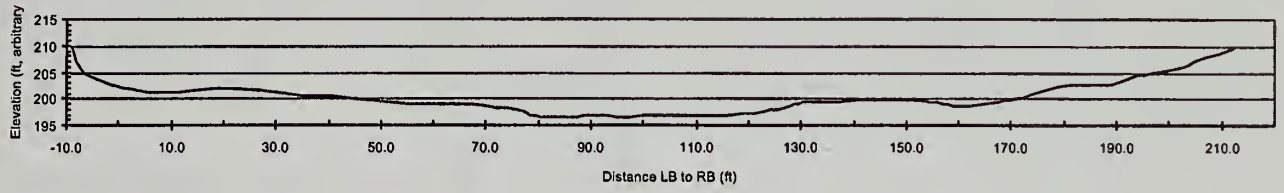

Cross-Section 1
Station 0+83
Floodprone Width
Bankfull Width
Elevation (ft, arbitrary)
212
210
208
206
204
202
200
198
196
194
-10.0
10.0
30.0
50.0
70.0
90.0
110.0
130.0
150.0
170.0
190.0
210.0
Distance LB to RB (ft)

Cross-Section 1 Station 0+83
Upper Hydraulic Modeling Site



scale: 3:1 V:H

Cross-Section 1
Station 0+83



scale: approx 1:1 H:V

XS2 Ste 2+36
Upper Hydraulic Modeling Site Approx Station 2+36
This is the 2nd XS downstream
9-Aug-04

104.87

Station	BS	HI	FS	Elev	Notes	convert to USGS Dist LB to	Elevation
0.0	4.17	103.19		99.02	Top LBHP XS2	-6.5	207.74
-6.5			0.32	102.87	LB, left of STA -6.5 is near vertical, ~70-80 degress angle end ~ 35' in height.	-1.0	205.89
-1.0			2.17	101.02		-2.0	202.94
-2.0			6.12	98.07		0.0	202.49
0.0			5.57	97.62	Bese LBHP XS2	1.4	201.79
1.4		103.19	6.27	96.92		7.0	201.39
7.0		103.19	6.67	96.52	Bedrock	10.0	200.7
10.0			7.36	95.83	Bedrock	13.0	200.43
13.0			7.63	95.56	Bedrock	15.0	199.74
15.0			8.32	94.87	Bedrock	22.0	199.76
22.0			8.30	94.89	gravel/cobble bar	28.0	199.61
28.0			8.45	94.74	gravel/cobble bar	37.0	199.62
37.0			8.44	94.75	gravel/cobble bar	52.0	200.02
52.0			8.04	95.15	gravel/cobble bar	59.0	200.08
59.0			7.98	95.21	gravel/cobble bar	68.0	199.98
68.0			8.10	95.09	gravel/cobble bar	69.0	201.4
69.0			6.66	96.53	dense willows	74.0	201.17
74.0			6.89	96.30	dense willows	79.0	201.37
79.0			6.69	96.50	dense willows	86.0	200.83
86.0			7.23	95.86	dense willows	88.0	198.74
88.0			9.32	93.87	dense willows	92.0	197.33
92.0			10.73	92.46	dense willows	92.8	196.11
92.9			11.95	91.24	LEW	97.0	193.71
97.0			14.35	88.84		102.0	193.62
102.0			14.44	88.75		106.0	193.61
106.0			14.45	88.74		109.0	193.53
109.0			14.53	88.66		114.0	193.62
114.0			14.44	88.75		118.0	193.73
118.0			14.33	88.86		127.0	195.29
127.0			12.77	90.42		128.0	196.08
128.0		103.19	11.98	91.21	REW	131.0	198.58
131.0			9.48	93.71	dense trees, veg.	137.0	199.85
137.0			8.21	94.98	dense trees, veg.	140.0	200.44
140.0			7.62	95.57	dense trees, veg.	147.0	202.52
147.0			5.54	97.65	dense trees, veg.	152.4	203.46
152.4			4.60	98.59	dense trees, veg.	162.0	203.28
162.0			4.78	98.41	dense trees, veg.	165.0	203.07
165.0			4.99	98.20	Toe RB	171.0	205.28
171.0			2.78	100.41		176.0	207.18
176.0			0.88	102.31		178.7	207.87
178.7			0.19	103.00			

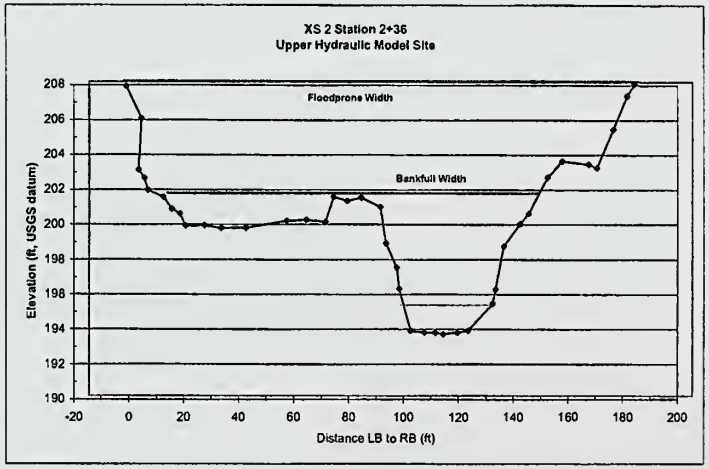
+ 1.95' to base of railroad bridge abutment @ same slope as between 176.0 and 178.7
CC abutment is 9' vertical

END XS 2 (STA 2+36)

103.19			8.54	94.85	TP1
	4.12	88.77		94.65	TP1 - new HI
--->			4.14	94.63	Bridge Ht. Base Pt.
			5.1	93.67	TP2
	8.35	102.02		93.67	TP2

Use 102.02 as HI for XS3

Height of bridge low chord =118.63



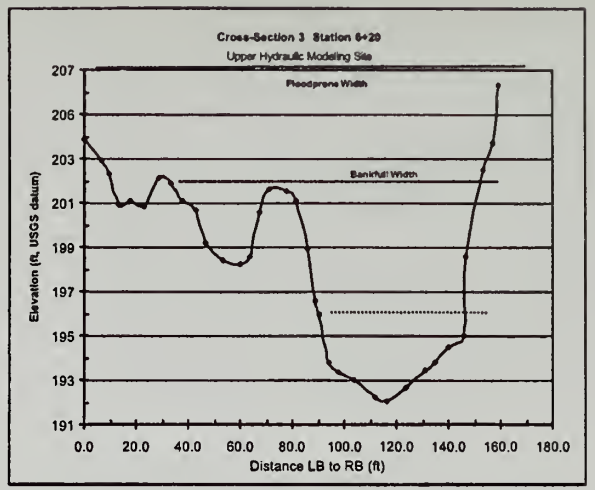
XS3 Sta 6+20
Upper Hydraulic Modeling Site Approx Station 6+20
This is the 3rd XS downstream
#########

104.87

Station	BS	HI	FS	Elev	Notes
0.0		102.02	2.56	99.46	Top LBHP XS3 - HI carryover from X62
0.0			2.99	99.03	Base LBHP XS3
7.0			3.96	98.04	sand
9.4			4.58	97.44	sand
13.5			6.02	96.00	sand
16.0			5.76	96.26	sand
23.0			6.10	95.92	willows
29.0			4.75	97.27	willows
33.0			4.99	97.03	willows
36.0			5.79	96.23	sand/gravel
42.7			6.22	95.80	sand/gravel
46.3			7.66	94.34	sand
53.0			6.46	93.54	sand
60.0			6.64	93.38	sand
63.7			6.31	93.71	sand
67.5			6.29	95.73	willows
71.0			6.30	95.72	willows
76.0			5.36	96.66	willows
81.6			5.80	96.22	willows
86.0			8.01	94.01	willows/bank full?
89.0			10.29	91.73	sand
90.4			10.96	91.06	LEW
94.0			13.07	88.95	
96.0			13.55	88.47	
104.0			13.86	88.16	
112.0			14.89	87.33	
116.0			14.88	87.14	thalweg
124.0			14.26	87.76	
131.0			13.46	88.54	
135.0			13.07	88.95	
140.0			12.36	89.64	
146.0			11.86	90.16	REW; not water surface level
147.0			6.34	93.68	
153.0			4.39	97.63	
157.0			3.21	98.81	
159.0		102.02	0.62	101.40	
162.0					from STA 162.0 slope is 10' vertical and 40' horizontal

convert to USGS

Dist LB t	Elevation
0.0	203.6
7.0	202.91
9.4	202.31
13.5	200.87
16.0	201.13
23.0	200.79
29.0	202.14
33.0	201.8
36.0	201.1
42.7	200.67
46.3	199.21
53.0	198.41
60.0	198.25
63.7	198.58
67.5	200.6
71.0	201.59
76.0	201.53
81.6	201.09
86.0	198.88
89.0	196.6
90.4	195.93
94.0	193.82
96.0	193.34
104.0	193.03
112.0	192.2
116.0	192.01
124.0	192.63
131.0	193.41
135.0	193.82
140.0	194.51
146.0	195.03
147.0	198.55
153.0	202.5
157.0	203.68
159.0	206.27



XS4 Sta 7+13
Upper Hydraulic Modeling Site Approx Station 7+13
This is the 4th XS downstream
##########

Station	BS	HI	FS	Elev	Notes
	0.63	100.09		99.46	Top LBHP XS3
			9.20	90.89	TP3 (90.89)
	8.47	99.36		90.89	TP3 (90.89)
41.0			4.04	95.32	sand
46.0			4.68	94.69	sand
48.3			5.29	94.07	sand
54.0			5.30	94.06	sand/gravel
60.0			5.58	93.79	sand/gravel
67.0			5.85	93.51	sand/gravel
75.0			6.13	93.23	sand/gravel
82.0			6.41	92.95	sand/gravel
87.0			7.01	92.35	willows
92.0			8.84	92.52	willows
97.0			7.72	91.64	willows
98.4			8.98	90.39	LEW
102.0			9.54	89.82	
108.0			8.33	90.03	
114.0			9.95	90.41	
120.0			9.35	90.01	
127.0			9.27	90.09	
132.0			8.59	89.77	
137.0			8.89	89.47	
141.0			8.91	89.45	thalweg
144.0			9.62	98.74	
147.9			9.12	90.24	wet toe
147.7			9.98	90.39	water surface level RB
148.8			8.22	93.14	RipRap
150.0			6.80	92.76	RipRap
153.0			4.84	94.52	sand
155.6			3.40	85.96	Base RBHP
155.6			2.29	97.09	Top RBHP XS4
	7.48	104.56		97.08	Top RBHP XS4 - move instrument
163.9		104.56	2.42	102.14	RipRap
166.8			2.00	102.56	RipRap
169.3			0.45	104.11	RipRap

To Road 8' vertical, 12' horizontal (STA)

39.0			8.84	95.72	sand
32.0		104.56	7.33	97.23	sand/trees
27.0			5.46	99.10	TOB, LB
24.0			6.12	99.44	sand/trees
18.0			4.78	99.81	sand/trees
9.0			2.94	101.62	
0.0		104.56	1.09	103.47	ground at LBHP XS4
0.0			0.61	103.95	Top LBHP XS4
-3.0			0.20	104.36	Base RR grade 2:1 to top ~ 20' horizontal

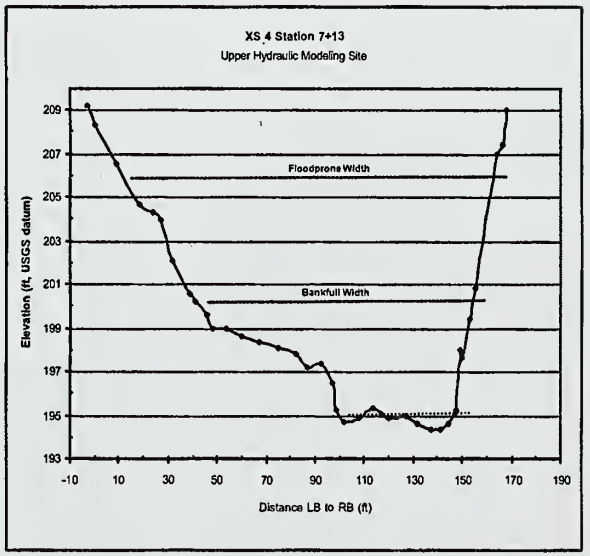
Elevation of top LBHP XS4 = 103.95
End XS4 (STA 7+13)

		104.56			
			10.78	93.80	TP4
	4.72	98.52		93.80	TP4 - NEW HI

Start XS 5 at Station 9+15 use HI = 98.52

convert to USGS 104.87

Dist LB t	Elevation
-3	209.2
0	208.3
9	206.5
19	204.7
24	204.3
27	204.0
32	202.1
39	200.6
41.0	200.2
46.0	199.6
48.3	198.9
54.0	199.9
60.0	199.7
67.0	199.4
75.0	199.1
82.0	197.9
87.0	197.2
92.0	197.4
97.0	196.5
99.4	195.3
102.0	194.7
108.0	194.9
114.0	195.3
120.0	194.9
127.0	195.0
132.0	194.6
137.0	194.3
141.0	194.3
144.0	194.8
147.8	195.1
147.7	195.3
148.8	199.0
150.0	197.6
153.0	199.4
155.6	200.8
163.9	207.0
165.9	207.4
168.3	209.0



XS5 Sta 9+15
Upper Hydraulic Modeling Site Approx Station 8+15
This is the 5th XS downstream
#########

Station	BS	HI	FS	Elev	Notes
48.0		98.62	4.01	94.51	sand. bank full?
58.0			5.03	93.49	sand
62.0			5.94	92.58	sand/gravel
68.0			6.68	91.84	sand/gravel
70.0			9.55	98.87	LEW
73.0			9.36	98.18	
79.0			9.13	99.39	
82.0			9.54	98.98	thalweg
87.0			9.09	98.44	
83.0			8.62	98.90	
88.0			8.55	99.87	
104.0		98.52	8.59	89.83	
110.0			9.60	99.92	
117.0			8.35	90.17	REW
125.0			8.14	90.38	gravel/veg
131.0			9.10	90.42	gravel/veg
138.0			6.89	91.53	willows
141.0			5.23	93.29	willows
148.0			8.02	92.50	trees
151.0			5.54	92.98	trees
157.0			5.62	93.00	trees
151.8			4.57	83.95	Base RBHP
181.8			3.25	95.27	Top RBHP
181.8	12.38	107.65		95.27	Top RBHP
162.8					Top RBHP (difference is tape) - going upslope
163.5			12.24	96.41	ubtracted .9 from station164.4 to sta 186.4 to correct for tape
168.5			8.88	97.78	
171.8			9.55	99.10	
	12.38			107.65	Top RBHP
175.1		107.63	7.30	100.33	
178.5			5.81	102.02	
183.1			3.98	103.77	
185.5			2.30	105.33	

from 186.4 to road grade = 5' horizontal and 3.8' vertical.
7' horizontal from road grade to edge asphalt road, 2" thick asphalt.

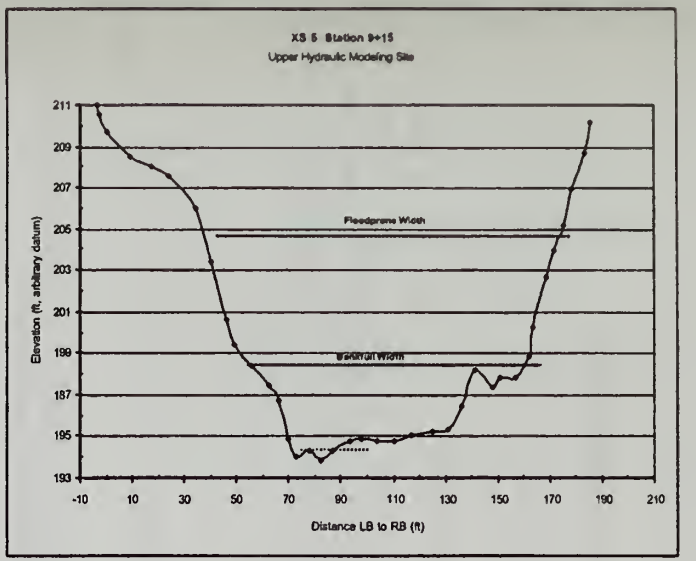
48.0		11.83	95.70	brush and trees
40.0	107.63	8.10	99.53	brush and trees
34.0		8.49	101.14	brush and trees
24.0		4.99	102.74	brush and trees
17.0		4.49	103.14	brush and trees
8.0		4.01	103.62	brush and trees
0.0		2.84	104.79	base LBHP XS5
0.0		2.03	105.60	top LBHP XS5
-2.3		1.96	105.67	going upslope
-3.5		1.51	106.12	going upslope

Slope continues another ~10' vertical to railroad grade.

Elevation of "low beam" of bridge is 24' above elevation of "bridge Ht. Base point", marked w/ arrow, near bottom of BOOK A, pg. 44.
94.83 + 24 = 118.83 This is height of low chord on bridge

104.87 convert to USGS

Dist LB t	Elevation
-3.5	211.0
-2.3	210.5
0	209.7
9	209.5
17	209.0
24	207.5
34	206.0
40	203.4
46	200.5
49.0	189.4
59.0	188.4
92.0	187.5
89.0	185.7
70.0	194.9
73.0	194.0
78.0	194.3
92.0	183.8
87.0	194.3
83.0	194.8
98.0	194.8
104.0	194.8
110.0	194.8
117.0	195.0
125.0	189.3
131.0	185.3
139.0	189.4
141.0	199.2
149.0	197.4
151.0	197.8
157.0	197.8
191.8	199.8
193.5	200.3
169.5	202.8
171.9	204.0
175.1	205.2
178.5	209.9
193.1	208.8
195.5	210.2



Weiss Associates Environmental Science, Engineering and Management
5801 Christie Avenue, Suite 600, Emeryville, CA 94608-1939 Fax: 510-547-5043 Phone: 510-450-6000

RESPONSE TO COMMENTS

for

DRAFT REPORT

CHANNEL GEOMORPHOLOGY STUDY NILES AND SUNOL DAM REMOVAL PROJECT ALAMEDA COUNTY, CALIFORNIA

prepared for

Project Management Bureau
San Francisco Public Utilities Commission
1155 Market Street
San Francisco, California

October 12, 2004

INTRODUCTION

Weiss Associates (Weiss) issued a Draft Study Report entitled Channel Geomorphology Study, Niles and Sunol Dam Removal Project, Alameda County, California, dated September 22, 2004. The Draft Study Report was discussed during a meeting held on September 30, 2004, and subsequent to that meeting the following agencies provided comments on the Draft Study Report: NOAA Fisheries; and Alameda County Flood Control and Water Conservation District. It is the intent of this Response to Comments document to capture the written comments along with the Consultant Team (Weiss Associates and ENTRIX, Inc.) response. It is recommended that this Response to Comments document be retained within the project file for potential relevance during upcoming project phases.

There is no significance to the order of the below-listed Agency comments.

The Consultant Team response to the comments is provided in italics following each Agency comment.

NOAA Fisheries, Comments provided by Gary Stern via E-mail on October 8, 2004:

1. Regarding the body of the report, we suggest the inclusion of the long profile plot below Sunol Dam and the cross-section surveys, all converted to USGS datum. Mitchell Katzel and Jonathon Mann have developed this information and discussed its inclusion in the report.

   The requested data has been included within Appendix B and referenced within the report (Section 2.4.2, Upper Hydraulic Modeling Site).

2. Sunol and Niles Dams Sediment Removal - allowing the sediments to naturally erode and transport downstream is desirable, but not a critical issue for NOAA Fisheries. This study has determined that Alameda Creek within Niles Canyon has adequate gravel and cobble supplies for fish habitat under existing conditions and projected future conditions. The potential loss of 39,200 cubic yards (37,000 at Sunol and 2,200 at Niles) due to excavation and end-hauling is not expected to degrade fish habitat conditions in Niles Canyon. Short-term in-channel impacts during excavation can be addressed through best management practices (BMPs). NOAA Fisheries concurs with the wording of the paragraph proposed for inclusion in Section 4.1 of the Final Report (presented in the Minutes of September 30, 2004 Meeting).

   The requested wording has been included within Section 4.1.

3. Sunol Dam Infrastructure Removal - the draft report recommends an elevation of 194.4 as the design benchmark for dam removal purposes (compared to the CER which proposed removal to

197.0 with an additional 3 foot notch near the right bank) and an adverse slope be cut across the top. NOAA Fisheries supports the creation of an adverse slope at the weir crest. Regarding the elevation of the weir crest, NOAA Fisheries supports the lower final design to ensure there will be no effect on fish passage under future conditions. The reasoning is that the thalweg elevation at the dam may expose a portion of the crest from an entrenched low flow channel condition that could occur over the long term. The Consultant Team has proposed the addition of a closing paragraph in Section 4.2 of the report that captures this issue (presented in the Minutes of September 30, 2004 Meeting). NOAA Fisheries concurs with the wording of this paragraph and requests its inclusion in the report.

The requested wording has been included within Section 4.2.

4. (NOTE TO SFPUC: Although not for this report, NOAA Fisheries would like to continue this discussion with the SFPUC regarding of the final design elevation of the Sunol Dam crest. If an elevation of 192 feet is selected as the design benchmark, the finished dam elevation would be backwatered at low flow by at least 1 foot due to the bedrock hydraulic control downstream. This will provide for water depth over any exposed portion of the dam due to local scour. An elevation of 192 also allows for uncertainties associated with demolition tolerances, data resolution, and accuracy's of analysis/calculations.)

   Comment noted and no change in report is necessary.

5. Niles Dam Infrastructure Removal - NOAA Fisheries supports the draft report's recommendations to remove an additional 66 feet of abutment and remove an additional 1.9 feet of bed elevation.

   The wording provided within the Minutes of the September 30, 2004, Meeting regarding Niles Dam has been included within Section 4.2.

ACFCWCD, Comments provided by Laurel Collins, Director, Watershed Sciences, via E-mail on October 8, 2004:

6. As I presently understand, the proposed Sunol and Niles Dam removal projects recommend that sediment stored behind the dams should be allowed to naturally redistribute through the Alameda Creek system. Much of this sediment will eventually accumulate in the Alameda Creek Flood Control Project and will need dredging to maintain the required channel capacity. This places significant importance on the potential amount of sediment that might accumulate in the Flood Control Channel because dredging is costly to the County.

   The bulk of sediment stored behind the two dams is located behind the larger Sunol Dam.

   By using pre-existing data, I believe progress has been made at trying to re-interpret the amount of sediment that is presently stored behind Sunol Dam. Yet, I believe a great amount of uncertainty still remains about how much sediment may be stored and potentially

remobilized. This does not come across in your report. There are several examples of why your sediment volume of 37,000 cubic yards might be an underestimation of stored sediment.

First, there isn't any streambed survey data upstream of the postulated depositional zone. Such information would help us see and interpret changes in stream gradient and potentially help verify your prediction of the upstream extent of the backwater deposition by showing a significant and uniform steepening of the stream gradient at the predicted position. Alternatively, it could also indicate the existence of a steeper gradient backwater bar in a defined depositional zone, or a stream gradient that does not significantly change until thousands more feet upstream.

Secondly, there isn't any subsurface boring data beyond 100 feet upstream of the dam face. Such information would help us assess the pre-dam bed level by locating changes in stream particle size at depth and it might indicate the depth or presence of bedrock. Your present estimate of 37,000 cubic yards of stored sediment was determined by projecting a line from the bed elevation, shown in the dam construction drawings (circa 1900), to a point upstream that intersects the approximate elevation of the spillway crest. The slope of this line was chosen to be similar to the slope plotted from a USGS 7.5" topographic map (Figure 3). The USGS maps however, are not reliable for estimating stream slopes, especially given their resolution of contour intervals. Given that the dam was constructed to trap groundwater in upstream alluvial gravels near the confluence of Arroyo de la Laguna and Alameda Creek, and that the pre-dam drawing shows bedrock to be 25 feet below the dam crest, the probability exists that the pre-dam bed gradient did not intercept bedrock for greater than a mile or more upstream of the dam. It is conceivable that the pre-dam gradient was much flatter than the uniform slope gradient that is projected in Figure 11. The range of possible pre-dam bed gradients upstream of the dam might have been as flat as that shown to exist below the dam face in Figure 11 or could be as steep as the uniform gradient shown to project 2400 feet upstream of the dam. Yet by using the information presented, it is also possible to interpret that the depositional zone could extend another 1000 feet or more upstream. This would increase considerably the total volume of stored sediment.

Thirdly, the depositional zone shown in Figure 11 is not shown to extend beyond the elevation of the spillway crest. Yet backwater bars, extending farther upstream than the projected spillway crest elevation, commonly form upstream of reservoirs, especially those filled by sediment. This sediment is not accounted for in the reported estimates of storage for either dam. The aerial extent of these backwater bars can coincide with the backwater projection of the water level at peak flood over the spillway. The Channel Geomorphology Study does not provide an estimate of floodwater height above the dam crest or the distance upstream that sediment deposition would potentially be influenced during large flood events. Based upon reviewing photographs of floods spilling over the Sunol Dam, I expect that water depths over the spillway during moderate floods may be 5 feet or greater in height. Large infrequent floods could be twice as high, significantly pushing back the location of the projected backwater deposition zone. This also suggests that the total volume of stored sediment has behind the dams has been underestimated in the report.

Given these uncertainties, discussing a range of possible sediment volumes or giving some reasonable estimate of potential error in the reported value would be much more reasonable than the total estimate of 39,220 cubic yards for the combined storage of both dams.

During the meeting we also discussed the complexities of computing a realistic estimate of the total amount of sediment deposited and excavated from the Flood Control Channel. Volumes were computed in your report to provide a comparison of how much sediment has been removed by the County to how much sediment might be transported from storage behind the dams. Unfortunately, the amount of sediment that has been excavated does not represent the total amount of sediment that needs to be excavated to maintain channel capacity through the 12 miles of flood control channel. Your report estimates that Alameda County has removed approximately 19% of the long-term sediment load but this does not account for sediment that is still in need of dredging. Additionally, the total annual load is not presently well understood because there is insufficient information about bedload transport from the USGS Niles Gage Station. Therefore, since your estimate is probably in error and because a reliable number is most likely beyond a reasonable scope of your project, Richard Wetzig and I suggest that you remove from the report any estimates of percentage of the total long-term sediment load that has been removed by the County.

I reviewed the information on particle sizes behind the dam and think that the characterization of the sediments near the dam is adequate. Characterization of sediments at depth farther upstream through the extent of the depositional zone has not been conducted. I would expect that much of the stored sediments farther upstream have a D50 in the range of coarse to very coarse gravel. This should be further discussed in the report.

There has been discussion at various meetings that it might be possible to have SFPUC compensate the County to have sediments dredged from the flood Control Channel. This will require some kind of reliable estimate of the total volume of sediment that might be released from behind the dams before the dams are removed or could perhaps require long-term monitoring and compensation every few years as sediment losses from both dam sites are re-assessed. I suggest that the report provide rough cost estimates for removing the sediment and trucking it off site, versus the cost of removing the sediment from the Flood Control Channel in years hence. Also worth considering is whether the cost of hauling sediment off site could be minimized by using some of it on site to construct inner floodplain benches at the over-widened reaches near the dam structures. Clearly, this latter option would require some rethinking of the final design concept.

During the past 4 years SFPUC has conducted three studies to determine the extent of sediment deposited behind Sunol Dam: 1) Trihey & Associates 2000; 2) Geomatrix 2004, and 3) this Study 2004. Each study concluded with varying amounts of sediment stored behind Sunol dams with this Study amount being bracketed by the other two studies. There is an uncertainty associated with the estimates provided in each of the aforementioned studies. It would not be unexpected that a future study could result in a slightly different estimate (relative to the average annual sediment load carried by Alameda Creek). However, the estimates provided within this Study, using available data reviewed and developed, are

deemed by the Consultant Team to satisfy the SFPUC requested scope of services based upon our professional judgement. Further, the thrust of the ACFCWCD comments appears to be focussed towards resolving ACFCWCD cost related issues (e.g. - .....costly to the County....., ...to have SFPUC compensate the County...., ...compensation every few years...., ...the cost of removing the sediment from the Flood Control Channel...); *however, the purpose of this Study was to evaluate the potential for adverse impacts related to channel geomorphology and fish passage – but not to evaluate cost related issues pertaining to ACFCWCD. The Final Study Report, dated October 12, 2004, references this Response to Comments document so that interested parties can have access to ACFCWCD's perspective regarding sediment storage behind Sunol Dam.*

END OF RESPONSE TO COMMENTS

Weiss Associates Environmental Science, Engineering and Management
5801 Christie Avenue, Suite 600, Emeryville, CA 94608-1939 Fax: 510-547-5043 Phone: 510-450-6000

MINUTES OF MEETING

for

Niles and Sunol Dam Removal Project

Channel Geomorphology Study

Date: Thursday, September 30, 2004

Time: 9:15 AM – 12:00 PM

Location: NOAA – 777 Sonoma Avenue, Santa Rosa 95404

Meeting Purpose

The meeting purpose was to address Agency questions or concerns regarding the DRAFT Study Report (dated September 22, 2004, and issued on September 24, 2004, via email).

Meeting objectives to included:

- Brief presentation of DRAFT Study Report Content;
- Discuss Agency questions, comments, and/or issues regarding this Study; and
- Listing of remaining items to address prior to issuance of FINAL Study Report.

Attendees

Organizations and people in attendance included:

- City and County of San Francisco (CCSF) & Consultants

Jane Lavelle (tel)	Barbara Palacios	Josh Milstein (tel)
Anna Roche	Diana Sokolove	Rick Copper
Joseph Buitrago	Romeo Rombawa	Hydroconsult (tel)
Jerry McHugh(Weiss)	Mitchell Katzel (ENTRIX)	Brian Sak

- NOAA Fisheries

Gary Stern	Jonathon Mann	Erik Schmidt

- ACFCWCD

Richard Wetzig	Laurel Collins

Attached to the meeting minutes is the contact information for the Study Team.

Agenda Items (Discussed during meeting)

1. Introduction of Attendees, Project Role, and Opening Statements [all];
2. Confirm Agenda Items and Meeting Purpose/Objectives [all];
3. Brief presentation of DRAFT Study Report [SFPUC]
    - Data Analysis
    - Findings
    - Conclusions
    - Recommendations
4. Questions, Answers, and Discussion of DRAFT Study Report
5. Agency Issues
    a) Review of prior issues
    b) Remaining issues, if any
6. Process for addressing remaining Agency issues, if any [all]
7. Schedule for Issuance of Final Study Report [SFPUC]

Handouts

Handouts included:

1) Agenda; and
2) Table entitled, "Summary Disposition of Sediments, Comparison of Sediment Removal vs. Sediment Release.

Items Discussed

General

NOAA Fisheries stated that they would need more details on monitoring to be conducted by SFPUC after the dams were removed. SFPUC stated that a MMRP would be prepared as part of the CEQA process to address this concern. SFPUC also commented that mitigation and monitoring would depend on whether the sediment is removed or remains.

Sediment

ACFCWCD advised:

1) That the sediment deposition and maintenance is considerably more complex than portrayed within the DRAFT report;

2) The completion and use of the flood control channel began approximately 1975 (not 1965 as mentioned in the DRAFT report) and report data should be adjusted accordingly;

3) ACFCWCD will be providing comments (along with supporting documentation) on the sediment disposition issues noted within the DRAFT report by October 8, 2004;

4) The last 4 miles of flood control channel have heavy sedimentation (up to 6 feet above design levels);

5) ACFCWCD has commitments to USACE regarding sediment removal within the flood control channel that include removal of sediments in excess of 2.5 feet above design level;

6) Flood control channel is 12 miles long and the last desilting covered 3 miles;

7) Potential sediment removal costs are staggering (20 to 30 million, not including mitigation) to do last 4 miles of the flood control channel;

8) There are areas upstream of dams where sediment exists;

9) ACFCWCD focuses efforts and concern in areas that would be most inundated during flood events;

10) Available data will be provided on sediment volumes above the initial construction elevations;

11) Some sediment is coming from the Bay (tidal influence up to 5 miles from Bay);

12) Flood control channel designed to carry 500 year flood event;

13) Alignment of flood control channel is 4 miles south of old Alameda Creek;

14) Tone of discussion on page ix may need to be adjusted;

Further, ACFCWCD (Laurel Collins) noted the following:

1) Bedload data is limited and perplexing;

2) Most of the bedload could eventually deposit in the flood control channel;

3) Will we be moving more coarse load when we increase the gradient above Sunol Dam?;

4) We don't have a good idea on sediment size proportionality (fines vs. coarse) of sediments moving downstream;

5) Cyril Williams data shows Arroyo de La Laguna cut down at rate of 0.5 feet per year from 1901 to 1911;

6) Documentcd flooding and unstablc channel in the teens; There was an increase in documentcd flooding and instability of Alameda Creek on its alluvial fan in the early 1900's. Therc arc many photos from the teens. The increase was most likely duc to the channelization of creeks across the Livermore-Amador Valley and subsequent drainage of the historic Tule Lake. The creeks were ditched across the valley well before the 1900's.

7) Would be more confident of data projections upstream of Sunol if it were shown that the projected gradient matched the existing gradient above the 2400 foot breakpoint shown on figure 11; and

8) Suggested that the sediment that was to be left in place at Sunol be moved into the areas that need to be stabilized (SFPUC noted that the final grading plan would be devcloped during the design phase).

NOAA Fisherics stated:

1. Alameda Creek, based on this Study and other observations, does not appear to be sediment starved and likely has sufficient sediment for fish habitat regardless of disposition of sediments behind the Sunol/Niles dams;

2. Released sediment may aid in recruitment of riparian vegetation along Alameda Creek.

3. Add information about the discussion of benefits versus negative impacts of removing sediment/leaving sediment in the stream. NOAA stated that benefits associated with leaving the sediments in the stream had more to do with avoiding impacts associated with removing the sediments (trucks, equipment entering the site).

Consultant Team response:

Consultant Team input and review subsequent to the meeting provides the following rebuttal comments and intended Final Report changes:

1. It would be helpful to have the slope up-gradient of the 2,400 ft Sunol Dam breakpoint to aid in further confirmation that this is the likely intersection with the historic streambed. However, the Consultant Team is confident that they surveyed to the upstream limit of the backwater influence of Sunol Dam based on the following field indicators: (1) change in bed particle size, (2) change in channel gradient, and (3) change in flow velocity. These field indicators provide reasonably good evidence from which to draw conclusions without an additional streambed elevation survey;

2. The Consultant Team will review any additional data as may be provided (by October 8, 2004) by ACFCWCD and adjust statements pertaining to the flood control channel as may be appropriate and justified. However, since the cutoff date (September 8, 2004) for

data to be reviewed and included within this Study has passed, no new data, nor new statements/discussion, regarding the flood control channel will be included. However, existing statements will be changed, if necessary.

3. The table provided at the meeting regarding sediment disposition entitled, "Summary Disposition of Sediments, Comparison of Sediment Removal vs Sediment Release", as attached (with a revision to the table as requested by ACFCWCD and discussed at the meeting), will be included within the Final Study Report in Section 4.1, Sediment Volume and Sediment Release from Niles and Sunol Dams. The Consultant Team is proposing (subsequent to the meeting) that the final paragraph in Section 4.1 will read:

"The proposed Project under EIR review entails an evaluation of either releasing or retaining (or an alternative in between) sediments impounded at Sunol and Niles dams. This Study evaluates both fish habitat and geomorphic effects with the results summarized in Table 12, Summary Disposition of Sediments, Comparison of Sediment Removal vs Sediment Release *(attached to these minutes)*. This summary table does not provide for effects beyond the scope of this Study that will be evaluated in the EIR process (e.g. – biological resource issues, environmental impacts during construction, cost). This Study concludes that 'sediment removal' behind the dams would have '*No Effect*' and that 'sediment release' (likely over several decades) would have "*Potential Effects, but not considered to be significant impacts to channel morphology or fish habitat above the flood control channel. There will be some sediment deposition in the flood control channel that present a maintenance issue.*" Further, in regards to the NOAA statement in their March 16, 2004, letter, *"...it is recommended by NOAA Fisheries that the extent of sediment removal be limited to the smallest amount necessary for removal of the Sunol Dam crest and foundation while providing for initial and long-term natural channel geometry. .....",* this Study does not provide any compelling justification to support the NOAA Fisheries position that the sediment removal at Sunol Dam should be limited to the smallest amount necessary."

Sunol Dam

Agency attendees were accepting of the proposed width of Sunol Dam removal provided within the Draft Study Report. NOAA Fisheries queried the Consultant Team on the project margin of error associated with the establishment of the historic streambed elevation at 194.4. Since the Consultant Team could not provide the associated margin of error in establishing the historic streambed elevation (194.4); NOAA Fisheries proposed that the Sunol crest be established at an elevation equal to, or lower than, the down-gradient (1,000') bedrock control point (approximately 193.0 USGS).

The Consultant Team is proposing (subsequent to the meeting) the inclusion of the following closing paragraph within Section 4.2, Dam Infrastructure Removal, Sunol Dam:

"NOAA Fisheries (person. com. Jonathon Mann, 2004) has proposed that consideration be given to lowering the Sunol Dam crest to the down-gradient (1,000 ft) bedrock elevation control point (approximately 193.0 USGS) to avoid any uncertainties (e.g. - crest re-exposure, data resolution, demolition tolerances, local scour) associated with establishing the historic streambed elevation (approximately 194.4 as determined by this Study). The down-

gradient bedrock elevation control point meets the criteria established within this Study and is therefore deemed an acceptable alternative. The final design elevation of the lowered Sunol Dam crest should be evaluated in concert with other competing resources that are outside the scope of this Study (e.g. - riparian habitat, biological resources, and cost) during future Project phases. Should the down-gradient bedrock elevation control point be chosen as the elevation of the lowered Sunol Dam crest, it is recommended that a construction survey be conducted at the time of the Sunol dam crest removal that includes the bedrock (1000' down-gradient) as a construction control point.

The March 16, 2004, NOAA Fisheries letter requested at Sunol Dam that, *"...The removal design should be sufficient to allow for initial and long-term dynamics to occur without interaction with the remaining dam structure. The extent of dam removal should provide for meandering of the low flow channel and avoid the re-exposure of any of the remaining foundation of Sunol Dam over the long term....."*. This Study concurs with the NOAA Fisheries statement and has developed criteria and potential alternatives for consideration during forthcoming Project phases that meet this NOAA Fisheries request."

The foregoing paragraph would only be included at one location (Section 4.2) in the Final Study Report.

Niles Dam

NOAA Fisheries was in agreement with the Study Report regarding all aspects of the proposed Niles Dam removal.

The Consultant Team is proposing (subsequent to the meeting) the inclusion of the following closing paragraph within Section 4.2, Dam Infrastructure Removal, Niles Dam:

"The March 16, 2004, NOAA Fisheries letter requested at Niles Dam that, *"... the left abutment be removed because this structure may continue to influence the stream channel during large channel forming flow events (i.e. mean annual flood events and above)."* This Study concurs with the NOAA Fisheries statement that the left abutment should be removed and has developed criteria and potential alternatives for consideration during the forthcoming EIR/Permitting process that meet this NOAA Fisheries request."

Action Items:

Consultant Team:

1) To provide NOAA Fisheries with the raw data regarding justification of the Sunol Dam crest removal provided within the Study Report (done as of October 1, 2004);

2) To provide Laurel Collins with available additional bed elevation survey data points upstream from Sunol Dam that may not have been included on Figure 11 (done as of October 1 and to be included as an updated Figure 11 within the report);

3) To address comments from the Agencies, due October 8, 2004; and

4) Issue the Final Study Report to SFPUC.

ACFCWCD:

1) Provide data to support any necessary changes to statements made regarding the flood control channel within the Draft Report; and

2) Provide comments, with supporting data, for proposed changes to the Draft Study Report, to the attention of Jerry McHugh, JM@Weiss.com, and Barbara Palacios, Bpalacios@sfwater.org, by close-of-business, Friday, October 8, 2004.

NOAA Fisheries:

1) Work with Consultant Team to resolve issues regarding establishment of the Sunol Dam crest elevation; and

2) Provide comments, with supporting data, for proposed changes to the Draft Study Report, to the attention of Jerry McHugh, JM@Weiss.com, and Barbara Palacios, Bpalacios@sfwater.org, by close-of-business, Friday, October 8, 2004.

END OF MINUTES

Attachments: 1) Study Team List

2) Table 12, Summary Disposition of Sediments

STUDY TEAM

Table 1 presents the Study Team for the Channel Geomorphology Study, Niles and Sunol Dam Removal Project. The composition of the Study Team varied (added or change in level of participation) as the Study progressed. Only key organizations and members that participated are presented. This table was periodically updated during the course of the Study as organizations, members, roles, or contact information changed.

Table 1. Study Team Members and Agencies

Person	Contact	Role
Consultant Team		
Mitchell Katzel (Entrix)	707 833 2687 mkatzel@entrix.com	Lead Geomorphologist
Tom Taylor (Entrix)	916 386 3828 ttaylor@entrix.com	Fisheries Issues Support
Paul Wisheropp (Entrix)	916 923 1097 pwisheropp@entrix.com	Hydraulic Issues Support
Toby Leung (Weiss)	510 450 6124 tjl@weiss.com	Engineering Support
Jerry McHugh (Weiss)	510 450 6145 jm@weiss.com	Consultant Team (Weiss/Entrix) Project Manager
Other Consultants		
Vick Germany (ESA)	415 962 8415 vgermany@esassoc.com	Consultant Project Manager for EIR
Pete Hudson (ESA)	phudson@esassoc.com	Consultant EIR Hydrogeologist
Todd Crampton (Geomatrix)	510 663 4100 tcrampton@geomatrix.com	Consultants Conceptual Engineering Report (CER) Project Manager
Jim Watson (HDR)	510 302 2341 jim.watson@hdrinc.com	Consultant CER Lead Engineer

Person	Contact	Role
City and County of San Francisco		
Steve Apperson (LRMS)	sapperson@sfwater.org	Watershed Hydrologist, SFPUC
Jane Lavelle (Planning)	415 934 5708 jlavelle@sfwater.org	Policy oversight in Alameda Creek, SFPUC
Barbara Palacios (PMB)	415 554 0718 bpalacios@sfwater.org	Sunol/Niles Dam Removal Project Manager, SFPUC
Anna Roche (Planning)	415 551 4560 aroch@sfwater.org	Environmental Project Manager, SFPUC
Brian Sak (WQB)	925 862 5734 bsak@sfwater.org	Fish Biologist for Alameda Watershed, SFPUC
Rick Cooper (MEA)	415 558 5974 rick.cooper@sfgov.org	Lead Agency Representative, Planning Department
Diana Sokolove (MEA)	415 558 5971 diana.sokolove@sfgov.org	Lead Agency Representative, Planning Department
Joshua Milstein	joshua.d.milstein@sfgov.org	Legal Counsel, City Attorney's Office
Romeo Rombawa	415 551 4870 rrombawa@sfwater.org	Engineering Design Bureau lead
Joseph Buitrago	415 551 4862 jbuitrago@sfwater.org	Engineering Design Bureau support
Joanne Wilson (LRMS)	650 652 3205 jwilson@sfwater.org	Watershed Projects Coordinator, SFPUC
NOAA Fisheries		
Gary Stern	707 575 6060 gary.stern@noaa.gov	NOAA Lead Contact
Brian Clure	brian.clure@noaa.gov	Technical Support - Geomorphology
Jonathon Mann	707 575 6054 jonathon.mann@noaa.gov	Technical Support – Fish Passage
Erik Schmidt	707 575 6083 erik.schmidt@noaa.gov	Technical Support
California Department of Fish and Game		

Person	Contact	Role
Kristine Atkinson	831 427 2638 katkinson@dfg.ca.gov	CDFG Lead Contact
Marcin Whitman	916 4454 3832 mwhitman@dfg.ca.gov	Technical Support
Alameda County Flood Control and Water Conservation District		
Laura Kidd	510 670-6478 laura@acpwa.org	ACFCWCD Point-of-Contact (Maternity Leave)
Richard Wetzig	510 670 5702 rickw@acpwa.org	ACFCWCD Point-of-Contact
Elisa C. Gill	510 670 5435 elisag@acpwa.org	Engineer-Scientist
Carla Schultheis	510 670 5576 carla@acpwa.org	Associate Engineer-Scientist
Mebrahtu Gebre-Kidan.	(510) 670 5520 mebrahtu@acpwa.org	Maintenance and Operations
Laurel Collins (Watershed Sciences)	510 524 8204 collins@lmi.net	Consultant Fluvial Geomorphologist for ACFCWCD
USACE		
Molly Martindale	molly.martindale@spd02.usace.army.mil	Permitting Agency
RWQCB		
Ann Riley	alr@rb2.swrcb.ca.gov 1515 Clay Street Suite 1400 Oakland, CA 94612	Permitting Agency

Table 12. Summary Disposition of Sediments, Comparison of Sediment Removal vs Sediment Release

Note: This is a new table proposed for the Draft Study Report for Channel Geomorphology Study, Niles and Sunol Dam Removal Project, Section 4, Conclusions, Subsection 4.1, Sediment Volume and Sediment Release from Niles and Sunol Dams. THIS TABLE REVISED October 5, 2004.

Geomorphic and Fish Habitat Effect	Sediment Removal	Sediment Release
Fish Passage	**No effect**	**No effect.** Although fish passage could be impaired during a period of years when sediments are first evacuated from Sunol Dam, anadromous species are not present in the channel at this time.
Fish Rearing and Spawning Habitat	**No effect**	**Limited effects are possible.** Pool in-filling and sedimentation of spawning gravels may occur as part of aggradation processes. Not expected to be wide-spread or persistent. Additional spawning size gravels will be recruited to reach, which is considered a benefit to fish habitat.
Aggradation in Natural Channel	**No effect**	**Limited effects are possible.** The size of the sediment pulse would be within the range of natural variability. Some aggradation may occur, mostly enlarging existing sediment storage features such as bars, and deposition on the floodplain, although new bars may also form, bed sediment storage and bed elevation may increase, and local channel gradients may be altered as sediments are transported downstream. Aggradation effects would not be a persistent, or a permanent channel change, and are not expected to be severe. Sediments will disperse downstream over about a decade.
Sediment Deposition in Flood Control Channel	**No effect**	**Effects are likely to occur.** Almost all sediments will eventually reach the flood control channel, over a period of one to a few decades. Some sediments will deposit in the flood control channel and some will pass through.
OVERALL RATING	**No Effect**	**Potential Effects, but not considered to be significant impacts** to channel morphology or fish habitat above the flood control channel. There will be some sediment deposition in the flood control channel, that present a maintenance issue.

APPENDIX C
Responses to Notice of Preparation

erry Tamminen
Secretary for Environmental Protection

California Regional Water Quality Control Board

San Francisco Bay Region

Internet Address: http://www.swrcb.ca.gov
1515 Clay Street, Suite 1400, Oakland, California 94612
Phone (510) 622-2300 ∃ FAX (510) 622-2460

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Arnold Schwarzenegger
Governor

August 9, 2004
File No. 2198.09 (BKW)

Diana Sokolove
San Francisco Planning Department
1660 Mission Street, 5th Floor
San Francisco, CA 94103

Re: Notice of Preparation for the Sunol and Niles Dam Removal Project Draft Environmental Impact Report (EIR)
SCH Number: 2004072049

Dear Ms. Sokolove:

Thank you for the opportunity to review the *Notice of Preparation (NOP) for the Sunol and Niles Dam Removal Project Draft Environmental Impact Report (EIR)*. Regional Water Quality Control Board (Water Board) staff have the following comments on the NOP

Comment 1
Project Background, C. Description of Sunol Dam, Laboratory Testing of Impounded Sediments, page 7. In the discussion of the low levels of TPH diesel detected in two of the samples, the text notes that, "the laboratory indicated that the hydrocarbon pattern did not match its diesel standard." Based on this statement, the NOP concludes that TPH diesel is likely not present in the samples. This conclusion is not warranted by the data presented in the NOP. TPH diesel in the environment is degraded by biodegradation and chemical interactions with the environment; these processes alter the hydrocarbon pattern of the TPH as it is weathered. TPH that doesn't match the laboratory's diesel standard may be weathered TPH diesel, or it may be a hydrocarbon mixture with a non-petroleum origin. Non-petroleum hydrocarbons can sometimes be removed by passing the sample solution extracted from the sediment sample through a column packed with silica gel, which preferentially removes non-petroleum hydrocarbons.

This comment is informational, since the TPH diesel levels detected in the sediment samples were below levels of environmental concern.

Comment 2
Project Background, D. Description of Niles Dam, Proposed Creek Diversion and Dewatering Systems page 16. The last paragraph of this subsection refers to the use of straw bales as a filtering device for water being discharged back to Alameda Creek. Based on the experience of Water Board staff, straw bales are not effective filter media for turbid water. Please replace the use of straw bales with filter rolls, fiber coirs, or other effective filtration device.

This comment also applies to Item 5 in Table 1.

If you have any questions, please contact me at (510) 622-5680 or by e-mail at bkw@rb2.swrcb.ca.gov.

Sincerely,

Brian Wines
Water Resources Control Engineer, South/East Bay Section

cc State Clearinghouse, Attn: Katie Shulte Joung, P.O. Box 3044, Sacramento, CA 95812-3044

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 286-5505
FAX (510) 286-5513
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ADMINISTRATION

July 27, 2004

ALA084402
SCH 2004072049

Ms. Diana Sokolove
San Francisco Planning Department
1660 Mission Street, 5th Floor
San Francisco, CA 94103

Dear Ms. Sokolove:

SUNOL & NILES DAM REMOVAL PROJECT – NOTICE OF PREPARATION

Thank you for including the California Department of Transportation (Department) in the early stages of the environmental review process for the Sunol & Niles Dam Removal Project. The following comment is based on the Notice of Preparation:

Encroachment Permit
Work that encroaches onto the State Right of Way (ROW) requires an encroachment permit that is issued by the Department. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans, clearly indicating State ROW, must be submitted to the address below. Traffic-related mitigation measures will be incorporated into the construction plans during the encroachment permit process. See the following website link for more information:
http://www.dot.ca.gov/hq/traffops/developserv/permits/

Sean Nozzari, District Office Chief
Office of Permits
California DOT, District 4
P.O. Box 23660
Oakland, CA 94623-0660

Please forward two copies of the environmental document to the following address as soon as it is available.

Patricia Maurice, Associate Transportation Planner
Office of Transit and Community Planning, Mail Station 10D
California DOT, District 4
111 Grand Avenue
Oakland, CA 94612-3717

Please feel free to call or email Patricia Maurice of my staff at (510) 622-1644 or patricia_maurice@dot.ca.gov with any questions regarding this letter.

Sincerely,

TIMOTHY C. SABLE
District Branch Chief
IGR/CEQA

c: Mr. Scott Morgan, State Clearinghouse

Scott Taylor
2649 Barrington Terrace
Fremont, CA 94536
(510) 792-4199

August 7, 2004

Dear Ms. Zianasokolove,

Firstly, I hope that I have spelled your name correctly. I got your name from a voice mail that was not that clear.

My name is Scott Taylor and I am on the board for Alameda Creek Alliance and I am writing you regarding the Sunol dam removal. Let me say first of all that I am really excited at the prospect of finally getting rid of the dams and one step further to returning steelhead and salmon to Alameda Creek.

However, I am also interested in Native American basketry. Along the banks of Alameda creek just above the Sunol Dam is a large area of sedge. Sedge rhizomes were used throughout Central California for basket weaving material. Before the advent of flood channel, culverts, etc., there were large sedge patches growing along creeks and rivers throughout the Bay Area. Now it is very difficult to find sedge patches of any size. Coyote Hills East Bay Regional Park has a program of reintroducing Ohlone culture to Ohlone descendents. The program has recently been using the sedge patch along that section of Alameda Creek for basketry material.

Of course the main concern of everyone is the dam removal and the return of the steelhead. If it would be possible to remove the dam and yet save the sedge patch, that would also great news.

Sincerely,

Scott Taylor

Scott Taylor

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

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Ms. Diana Sokolove
San Francisco Planning Department
1660 Mission Street, 5th Floor
San Francisco, California 94103

SCH #2004072049, Notice of Preparation for the Sunol and Niles Dam Removal Project Draft Environmental Impact Report (EIR), July 9, 2004
Alameda County

Dear Ms. Sokolove:

The Division of Safety of Dams has reviewed the draft EIR for the Sunol and Niles Dam Removal Project. Sunol Dam, No. 10-017 and Niles Dam, No. 10-007, are no longer under State jurisdiction for safety.

Proposed modifications for these dams will not alter their current jurisdictional status; therefore no applications for the alteration of these dams are required.

If you have any questions, please contact Office Engineer Chuck Wong at (916) 227-4601 or Regional Engineer Frederick Sage at (916) 227-4604.

Sincerely,

for

David A. Gutierrez, Acting Chief
Division of Safety of Dams

cc: Ms. Nadel Gayou
Resources Agency Project Coordinator
Environmental Review Section, DPLA
901 P Street
Sacramento, California 95814

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Jan Boel
Acting Director

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Notice of Preparation

July 9, 2004

To: Reviewing Agencies

Re: Sunol and Niles Dam Removal Project
SCH# 2004072049

Attached for your review and comment is the Notice of Preparation (NOP) for the Sunol and Niles Dam Removal Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Diana Sokolove
San Francisco Planning Department
1660 Mission Street, 5th Floor
San Francisco, CA 94103

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Project Analyst, State Clearinghouse

Attachments
cc: Lead Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

State Clearinghouse Data Base

SCH# 2004072049
Project Title Sunol and Niles Dam Removal Project
Lead Agency San Francisco Planning Department

Type NOP Notice of Preparation

Description The project consists of the partial removal of the Sunol Dam and Niles Dam to allow fish passage and to address liability and public safety issues. In association with the removal of the dams, impounded sediment would either be left in place, or would be off-hauled except for a portion of the sediments to fill in the plunge pools downstream of both dams.

Lead Agency Contact

Name Diana Sokolove
Agency San Francisco Planning Department
Phone 415-558-5971 **Fax**
email
Address 1660 Mission Street, 5th Floor
City San Francisco **State** CA **Zip** 94103

Project Location

County Alameda
City Fremont
Region
Cross Streets
Parcel No.
Township 4S **Range** 1E, 1W **Section** 7 **Base**

Proximity to:

Highways 84, 238, 680
Airports
Railways Niles Canyon RR (formally
Waterways Alameda Creek, Arroyo de la Laguna, Stonybrook Creek, Sinbad Creek, several unnamed drainages
Schools
Land Use Dams

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Cumulative Effects; Flood Plain/Flooding; Geologic/Seismic; Noise; Other Issues; Public Services; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife

Reviewing Agencies Resources Agency; Regional Water Quality Control Board, Region 2; Department of Parks and Recreation; Native American Heritage Commission; Office of Historic Preservation; Department of Water Resources; Department of Fish and Game, Region 3; Department of Fish and Game, Marine Region; California Highway Patrol; Caltrans, District 4

Date Received 07/09/2004 **Start of Review** 07/09/2004 **End of Review** 08/09/2004

Note: Blanks in data fields result from insufficient information provided by lead agency.

Resources Agency

- [ ] **Resources Agency**
  Nadell Gayou
- [ ] **Dept. of Boating & Waterways**
  Suzi Betzler
- [ ] **California Coastal Commission**
  Elizabeth A. Fuchs
- [ ] **Colorado River Board**
  Gerald R. Zimmerman
- [ ] **Dept. of Conservation**
  Roseanne Taylor
- [ ] **California Energy Commission**
  Environmental Office
- [ ] **Dept. of Forestry & Fire Protection**
  Allen Robertson
- [ ] **Office of Historic Preservation**
  Hans Kreutzberg
- [ ] **Dept of Parks & Recreation**
  B. Noah Tilghman
  Environmental Stewardship Section
- [ ] **Reclamation Board**
  DeeDee Jones
- [ ] **Santa Monica Mountains Conservancy**
  Paul Edelman
- [ ] **S.F. Bay Conservation & Dev't. Comm.**
  Steve McAdam
- [ ] **Dept. of Water Resources**
  Resources Agency
  Nadell Gayou

Fish and Game

- [ ] **Dept. of Fish & Game**
  Scott Flint
  Environmental Services Division
- [ ] **Dept. of Fish & Game 1**
  Donald Koch
  Region 1
- [ ] **Dept. of Fish & Game 2**
  Banky Curtis
  Region 2
- [ ] **Dept. of Fish & Game 3**
  Robert Floerke
  Region 3
- [ ] **Dept. of Fish & Game 4**
  William Laudermilk
  Region 4
- [ ] **Dept. of Fish & Game 5**
  Don Chadwick
  Region 5, Habitat Conservation Program
- [ ] **Dept. of Fish & Game 6**
  Gabrina Gatchel
  Region 6, Habitat Conservation Program
- [ ] **Dept. of Fish & Game 6 I/M**
  Tammy Allen
  Region 6, Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Game M**
  George Isaac
  Marine Region

Other Departments

- [ ] **Food & Agriculture**
  Steve Shaffer
  Dept. of Food and Agriculture
- [ ] **Dept. of General Services**
  Robert Sleppy
  Environmental Services Section
- [ ] **Dept. of Health Services**
  Wayne Hubbard
  Dept. of Health/Drinking Water

Independent Commissions,Boards

- [ ] **Delta Protection Commission**
  Debby Eddy
- [ ] **Office of Emergency Services**
  John Rowden, Manager
- [ ] **Governor's Office of Planning & Research**
  State Clearinghouse

_____

- [ ] **Native American Heritage Comm.**
  Debbie Treadway
- [ ] **State Lands Commission**
  Ken Lewis
- [ ] **State Lands Commission**
  Jean Sarino
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Business, Trans & Housing

- [ ] **Caltrans - Division of Aeronautics**
  Sandy Hesnard
- [ ] **Caltrans - Planning**
  Terri Pencovic
- [ ] **California Highway Patrol**
  John Olejnik
  Office of Special Projects
- [ ] **Housing & Community Development**
  Cathy Creswell
  Housing Policy Division

Dept. of Transportation

- [ ] **Dept. of Transportation 1**
  Mike Eagan
  District 1
- [ ] **Dept. of Transportation 2**
  Don Anderson
  District 2
- [ ] **Dept. of Transportation 3**
  Jeff Pulverman
  District 3
- [ ] **Dept. of Transportation 4**
  Tim Sable
  District 4
- [ ] **Dept. of Transportation 5**
  David Murray
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- [ ] **Dept. of Transportation 6**
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  John Pagano
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- [ ] **Dept. of Transportation 9**
  Gayle Rosander
  District 9
- [ ] **Dept. of Transportation 10**
  Tom Dumas
  District 10
- [ ] **Dept. of Transportation 11**
  Mario Orso
  District 11
- [ ] **Dept. of Transportation 12**
  Bob Joseph
  District 12

Cal EPA

Air Resources Board

- [ ] Airport Projects
  Jim Lerner
- [ ] Transportation Projects
  Kurt Karperos
- [ ] Industrial Projects
  Mike Tollstrup

- [ ] **California Integrated Waste Management Board**
  Sue O'Leary
- [ ] **State Water Resources Control Board**
  Jim Hockenberry
  Division of Financial Assistance
- [ ] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Steven Herrera
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control**
  CEQA Tracking Center

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Jonathan Bishop
  Los Angeles Region (4)
- [ ] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** _____

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Last Updated on 05/21/04

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